STATUS OF DIARRHOEAL DISEASES IN THE WESTERN PACIFIC REGION
AND PROGRAMMES PRESENTLY DIRECTED TOWARDS THEIR CONTROL

Technical Presentation

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Enteric Infections (see Annex 1).
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1. INTRODUCTION

The epidemiological patterns of diarrhoeal diseases and their incidence depend on numerous biological, social, economic and ecological factors, which vary from country to country.

Member States of the WHO Western Pacific Region belong to a variety of cultures and socio-economic systems. They range from cold regions to tropical zones, comprising the largest continental and sea surfaces and the largest and smallest countries or areas in the world, at various levels of development. Obviously the magnitude of the problem which diarrhoeal diseases represent for those countries must vary, just as much as the means and the technology used in their control. Besides their effect on health and nutrition, the incidence of diarrhoeal diseases, and cholera outbreaks in particular, has considerable economic implications.

Experience gained by Member States in the control of diarrhoeal diseases represents a wealth of knowledge which should be exchanged, as both developed and developing countries have much to learn from, and to give to, each other. It is hoped that this technical presentation will stimulate a more fruitful exchange of experience in the control of diarrhoeal diseases to the mutual benefit of all.

2. STATUS OF DIARRHOEAL DISEASES

Analysis of available statistics on the relative frequency and prevalence of diarrhoeal diseases in the countries or areas of the Region confirms that there are great differences among them.

2.1 Epidemiological patterns

The data point to a few facts of general importance in assessing the relative risks of various population groups in contracting different diarrhoeal diseases such as shigelloses, salmonelloses, cholera, gastroenteritis of various origin and those caused by intestinal parasites. The very young and the old are the most susceptible to those diseases and deaths occur more frequently among them in both developed and developing countries. In the latter, however, the mortality rate is many times higher than in the former because unfavourable socio-economic conditions and poor nutrition are conducive to infection and its sequelae: malnutrition and death.\footnote{There is a correlation between mortality in children under five years of age and mortality due to diarrhoeal diseases.} In general terms, this is true for countries or areas in all Regions, including those of the Western Pacific. The health statistics systems, and the ways data are collected, classified and presented, differ to such an extent that a reliable, meaningful comparison cannot be made. Nevertheless, the magnitude of the problem caused by the incidence of diarrhoeal diseases can be appreciated.
For obvious reasons, enteric infections and diarrhoeal diseases are under-reported in health statistics returns. For example, the diarrhoeal disease rate reported for 1976 in the Philippines was 525, or 0.5% for each 100,000 of population, while in a survey carried out in the area where oral rehydration is being studied, reports from mothers at the same time indicated that 93.3% of children under five years of age had suffered from diarrhoeal diseases over the previous year. Some areas in the South Pacific, such as Gilbert Islands and Cook Islands, have reported rates of over 7000 per 100,000 population in recent years. It may not be pure coincidence that cholera has invaded Gilbert Islands, since it has one of the highest reported incidence rate of diarrhoeal diseases in the Region. Other surveys in developing countries or areas indicate that each child under five years of age has more than one, up to four, bouts of diarrhoea a year. For this reason, health statistical data should be interpreted with caution. As can be seen from Table 1, the frequency of enteric infections differs about one hundred-fold between the developed and the developing countries, pointing to the magnitude of the diarrhoeal disease problem in the latter. The highest incidence of diarrhoeal diseases in the Region occurs in Tonga. Cholera has been reported only from five of the 32 countries or areas in the Region.

**TABLE 1**

<table>
<thead>
<tr>
<th>FREQUENCY OF ENTERIC FEVERS AND DIARRHOEAL DISEASES REPORTED IN HEALTH STATISTICS RETURNS FOR 1976 IN SOME DEVELOPING AND DEVELOPED COUNTRIES OF THE WESTERN PACIFIC REGION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Countries</td>
</tr>
<tr>
<td>Developing:</td>
</tr>
<tr>
<td>Philippines</td>
</tr>
<tr>
<td>Tonga</td>
</tr>
<tr>
<td>Socialist Republic of Viet Nam</td>
</tr>
<tr>
<td>Developed:</td>
</tr>
<tr>
<td>Australia</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>New Zealand</td>
</tr>
</tbody>
</table>

*Dysentery only

There is a great difference in the frequency of specific enteric infections in the Region, as shown in Table 2. Although it has represented a great problem, either when it was first introduced or when explosive outbreaks have occurred, such as recently in Gilbert Islands, cholera is relatively infrequent throughout the Region as a whole. Salmonelloses and food poisoning are much more frequent but still considerably less so than dysentery. The group of diarrhoeal diseases which includes dysentery, represents 95% of the total number of reported cases of enteric infection.

**TABLE 2**

**RELATIVE FREQUENCY OF ENTERIC INFECTIONS AND DIARRHOEAL DISEASES REPORTED IN HEALTH STATISTICS RETURNS FOR 1976 FOR THE WESTERN PACIFIC REGION**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHOLERA</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td><strong>SALMONELLOSES</strong></td>
<td></td>
</tr>
<tr>
<td>Typhoid and paratyphoid</td>
<td>1.78)</td>
</tr>
<tr>
<td>Other salmonelloses</td>
<td>0.22)</td>
</tr>
<tr>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td><strong>POISONING</strong></td>
<td></td>
</tr>
<tr>
<td>Food of all kinds</td>
<td>2.69)</td>
</tr>
<tr>
<td>Fish</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>2.7</td>
</tr>
<tr>
<td><strong>DYSENTERY</strong></td>
<td></td>
</tr>
<tr>
<td>All forms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20.5</td>
</tr>
<tr>
<td><strong>OTHER DIARRHOEAL DISEASES</strong></td>
<td></td>
</tr>
<tr>
<td>Including gastroenteritis,</td>
<td></td>
</tr>
<tr>
<td>colitis, infantile diarrhea</td>
<td></td>
</tr>
<tr>
<td>and protozoal infections</td>
<td>74.4</td>
</tr>
</tbody>
</table>

For example, of the rates reported for 1976, the rate of typhoid and paratyphoid per 100 000 in Australia, Japan and New Zealand varies from 0.17 to 0.40, while in the developing countries of the Region it varies from 6.4 to 44.4. This represents a one hundred-fold difference that is also true for other enteric and diarrhoeal diseases. In view of frequent underreporting in developing countries, the real difference must be even greater. However, there are factors which greatly effect incidence in the developing countries. In some countries or areas, habits such as eating raw seafood and cold dishes and food sharing favour the spread of diarrhoeal diseases and enteric fevers and the incidence is relatively more
common there than one would expect in view of the state of the various national economies and the levels of education. In populations who traditionally drink hot liquids, eat boiled food, and respect general cleanliness and personal hygiene, even if their income is modest and facilities are limited, as is the case in many countries or areas of the Region, the incidence of diarrhoeal diseases is lower than would be expected from the national gross income or other indices of economic development. It goes without saying that the developed countries of the Region, through a rapidly growing economy and rising standards of personal hygiene and environmental sanitation, have solved the problems caused by most of the diarrhoeal diseases. An excellent example of this has been the rapid control of typhoid in Japan after the Second World War and the control of cholera and typhoid outbreaks in Singapore and in other countries. In Singapore, the national cleanliness campaign and the use of modern technology, such as the computer-assisted epidemiological surveillance and control of typhoid, have given excellent results.

It has been shown sufficiently that socio-economic development brings diarrhoeal diseases under control to such an extent that they cease to present an important public health or economic problem. Yet some developed countries of the Region, able to control the incidence of diarrhoeal diseases effectively, have lately suffered intrusions of cholera which shows that weak points exist and that they remain vulnerable, despite the belief that developed countries are not "receptive" to cholera because of their high levels of economic development, education, sanitation and hygiene. While, in general terms, that belief is correct, extensive travelling and tourism resulting from economic betterment expose an ever increasing number of people from the developed countries to infection. Since some of them may be particularly susceptible, or may not be observing high standards of personal hygiene, accidental infection is inevitable. The economic loss resulting from such accidents is great and may be more important than the health effect, because of the fact that effective treatment is available and death is thus prevented.

In spite of the great emotional stress and the economic consequences caused by an outbreak of cholera, this disease, which has a tendency to become endemic where the level of sanitation is low, represents, in endemic countries or areas, only a very small fraction of the total sickness due to diarrhoea. While the frequency of various types of diarrhoeal disease varies between developing and developed countries to a greater or lesser extent, they all suffer from some type of diarrhoeal disease.

2.2 Interaction between infection and nutrition

Diarrhoea produces an acute state of malnutrition through loss of water, electrolytes, amino acids and vitamins and through reduction of food intake, due to vomiting and anorexia and impairment of intestinal absorption. Since diarrhoea is often recurrent in early life, it may lead a child to a state of chronic malnutrition, with all its ill effects on growth and vitality. Once malnourished the child falls easily prey to infection. A vicious circle of infection-malnutrition-infection is thus established.
Sickness caused by a diarrhoeal disease also prevents foods available to a child being fully utilized, resulting not only in loss of health but also eventually in economic loss particularly detrimental to developing nations.

2.3 Economic aspects

Expenditure on treatment of the sick, on death and on prevention, can be directly related to the incidence of diarrhoeal diseases, representing a definite loss to the national economy. There are also indirect costs, such as wastage of food in sick children, decrease in learning and/or working ability, resulting in a decline in productivity, losses in tourism and in the export of perishable foodstuffs. It is difficult to determine and quantitate the total cost to the economy as a result of diarrhoeal diseases but it is important, as can be seen from many examples.

For instance, until it was proved, by studies carried out under WHO auspices, that bananas played no role in the spread of cholera, one country in the Region banned their import from another country where outbreaks of the disease were occurring. A minor outbreak in another area of the Region resulted in an estimated loss in exports of US$80 million. In epidemic years, tourism has practically ceased and much fresh food has been, often unjustifiably, destroyed because of quarantine measures.

Economic loss resulting from outbreaks of diarrhoeal disease is especially harmful to developing countries, because such loss slows down economic development and does not allow living standards to be improved. This in turn favours maintenance of a high incidence of disease. Thus, another vicious circle of poverty-diarrhoeal disease-poverty is perpetuated.

3. MEASURES FOR TREATMENT AND PREVENTION

In recent years, major progress has been made in the treatment and control of diarrhoeal diseases.

3.1 Treatment

The introduction of modern methods of intravenous fluid replacement has made possible the effective treatment of severe dehydration in cholera and other diarrhoeal diseases using very modest facilities. Oral rehydration has made possible rapid treatment at home; thus preventing severe dehydration and the need for intravenous fluid replacement. Methods of both oral and intravenous rehydration are now so simple that they can be used anywhere immediately they are needed. Thus, the fatality rate due to severe dehydrating diarrhoeal disease, such as cholera, has fallen to the level of one per cent or below. Therapy can be made available at primary health care level. Oral rehydration can, and should, be rapidly applied by mothers. Thus practically no one should die of dehydrating diarrhoea. If the primary aim of preventing infection cannot be achieved,
at least the lives of those who fall sick can be saved. High fatality rates due to diarrhoeal diseases can be effectively controlled. Unfortunately, in many areas they are not, because knowledge and facilities have not been made available to large masses of the population.

Controlled studies carried out at Bacolod, Philippines showed that oral rehydration is feasible and can prevent dehydration. They also showed that children administered glucose-electrolyte solution at home had a greater weight gain, both during an attack of diarrhoea and over a seven-month period, compared with the control group. This study suggests that vigorous compensation of salt and fluid losses does contribute to weight gain, probably by improving the appetite following a bout of diarrhoea. Oral rehydration, supported by education in nutrition, thus appears to be a public health tool for the prevention of malnutrition and for the improvement of the nutritional status of children.

3.2 Prevention

Prevention of diarrhoeal diseases, including cholera as mentioned above, depends primarily on the development of environmental sanitation and personal hygiene and other general measures of cleanliness and healthy living. There are also specific preventive measures, such as immunization and prophylactic medication, which are less effective as they are of short duration and directed against individual diseases.

3.2.1 Environmental sanitation

Environmental sanitation measures, such as the provision of efficient excreta disposal facilities and safe water supplies, especially when supported by health education, decreases human exposure to infection with enteric microorganisms and parasites. Since the infective dose for cholera has been shown to be very high, personal hygiene and environmental sanitation measures are very effective, even when they fall short of perfect. They will at least decrease the infective dose if not eliminate all vibrios.

Studies carried out jointly by workers from Japan, Philippines and WHO in Negros Occidental, as well as those elsewhere, show that a modest improvement of excreta disposal facilities and/or in the water supply, can bring cholera under control. The effect of such measures is cumulative, when the efforts in sanitation are sustained and sanitary facilities maintained and used properly. The same measures are effective against enteric fevers because the infective dose is also relatively high. They are less effective against shigelloses, since the infective dose for that infection is very low and thus a high degree of sanitation and/or personal hygiene is required to prevent spread. It seems also that a high degree of sanitation is necessary to effect the diarrhoeal diseases caused by E. coli and viruses.

The importance of environmental sanitation cannot be overemphasized, since not only does it permanently, not temporarily as with treatment and immunization, solve the overall problem of diarrhoeal diseases and enteric infections but it represents an essential condition for a healthy existence.
In some areas, the absence of sanitary facilities is not so much a problem as the proper use of the available facilities and their maintenance. The "human factor" and man's attitudes are as of much, if not more, importance than the facilities alone. The facilities cannot operate by themselves. It is, therefore, essential to pursue health education and to win the cooperation of the population. Strong determination and a political will to persist, for example through cleanliness campaigns, is a guarantee of success. It should not be forgotten, however, that the development of environmental sanitation measures and healthy habits is an evolutionary process and is not amenable to short-term campaigns or "crash" programmes.

Aetiological and ecological studies carried out in the Region have indicated that, as well as the common enteric infections, some lesser known types occur. The important role of viruses in causing diarrhoea is recognized and their prevalence in various areas and in various epidemiological circumstances needs to be further investigated.

Outbreaks of diarrhoeal disease due to *V. parahaemolyticus* have been reported and ecological studies of that organism in sea water and in fish carried out. In view of the importance of this food-borne disease for health and for the economy, and the insufficient knowledge of *V. parahaemolyticus* and its ecology, further studies are desirable, including studies on appropriate sanitary measures. Similarly, nonagglutinable vibrios have been found to be associated with cholera-like disease. The study of their ecology and survival in nature deserves attention in order to control outbreaks thought to be due to them. Further study of the survival of *V. cholerae* in the environment is also needed.

Sanitary measures for the control of food-borne outbreaks due to salmonella and other enteric bacteria require particular attention and the close collaboration of veterinary, agricultural and other services, since the control of most of those infections lies more within their spheres of activity than that of the health services. The food-borne diseases have an important economic effect because of the increasing international trade in foodstuffs.

### 3.2.2 Immunization

In the control of diarrhoeal diseases, the effectiveness of immunization is often overestimated. Medicine orientated physicians particularly, tend to resort to vaccination rather than to advocate sanitation measures and/or health education.

Vaccination against cholera protects only a proportion of those vaccinated for a relatively short period of time. Even recently improved whole-cell adjuvant vaccine has not changed the situation much. Vaccination against typhoid is effective, but only if given in two doses, as shown in a study carried out in Tonga. There is an effective live vaccine against dysentery but it is not suitable in practice for large-scale use. There is no effective vaccine for gastroenteritis due to viruses, *E. coli* or to other microorganisms.
There is scope for research on new immunizing agents, toxoids and killed and live oral vaccines but results cannot be expected in the near future. Nevertheless, in view of the fact that there will always be instances when the use of vaccines to combat diarrhoeal diseases will be justified and preferred, as in the case of disasters and for individual or group protection in certain circumstances, the excellent research facilities existing in the Region should be fully utilized.

3.2.3 Prophylactic medication

Numerous studies have shown that antibiotics and other antimicrobial drugs can effectively eliminate enteric pathogens. The use of such drugs is fully justified for the treatment of severe clinical cases. However, they are often recommended as prophylaxis for the population at large, to prevent possible infection and/or the spread of diarrhoeal diseases such as cholera. The effect of such medication is short lasting, and experience has shown it to be ineffective in the long run. In addition, there is an inherent danger of untoward reaction to the drug and the emergence of microbial resistance.

In the control of cholera, drug prophylaxis has been used in some instances as a substitute for good sanitation and personal hygiene and has, of course, invariably led to disappointment. It has also been observed that antibiotics may prolong the carrier state in cholera. They also render relapse more frequent in enteric fever.

Some observations indicate that the indiscriminate use of drug prophylaxis, for example by tourists, may promote infection by eliminating the normal flora. It also may raise a false sense of security causing neglect of the necessary precautions by risking the consumption of unsafe food.

As elsewhere in the world, the increase in resistance of enterobacteria through the wide use of antibiotics has been observed in the Western Pacific Region. Multiple drug resistance in S. typhi is of particular practical importance, as it makes the usual treatment of that severe illness ineffective. The treatment of cholera requires rehydration, not necessarily antimicrobial drugs, and prevention should be based primarily on environmental sanitation, food control and personal hygiene, not on the use of drugs.

It is, therefore, desirable to establish control over the use of antibiotics to prevent their abuse and yet at the same time make them available for treatment when indicated.

4. DELIVERY OF TREATMENT AND PREVENTION

Diarrhoeal diseases are so widespread and frequent that there is a need to deliver prophylaxis and treatment right at the periphery, to each family constantly. This obviously requires the extensive involvement of health workers at the primary health care level and the active participation of the community.
When speaking of "delivery," this should not be understood as mainly delivery from outside the community to members of the community but more as delivery by members of the community concerned to their fellow members.

4.1 Primary health care level

4.1.1 Oral rehydration

In order to prevent the development of dehydration and to ensure that the nutritional status of the child will not be impaired, it is essential to apply oral rehydration as soon as the first symptoms appear.

However intensive coverage by the primary health care services might be, without the full participation of the community, health workers will never be able to deliver oral rehydration to all children rapidly enough. It can be most rapidly initiated by an instructed and motivated mother supplied with the necessary ingredients. The oral rehydration powder can be easily produced at modest cost in almost any country but it is important that it be made available to families at a cost they can afford and at a place they can easily reach. Such places need not necessarily be the health centre; they could be the school or a local shop. There is a need for an effective system of distribution.

Studies carried out in the Philippines have shown that the community can definitely be motivated and that with its support an effective rehydration programme can be implemented.5,6

Nevertheless, problems in delivering oral rehydration to the population at the periphery caused by constraints imposed by socio-economic conditions, cultural traditions and living styles of various communities are not easy to solve. An appropriate and effective approach should first be found. In Lao People's Democratic Republic a pilot project, using medical students as instructors to introduce voluntary village health workers into the technique of oral rehydration, so that they in turn could explain it to mothers and make them use it, has proved effective. In other countries with different socio-economic conditions, a different system of delivery might perhaps prove more suitable. By initiating pilot projects and operational research a system best suited to a particular community might be arrived at. The usefulness of the team approach, involving health workers, nutritionists, sociologists, health educators, economists, anthropologists and others, cannot be overemphasized.

In the studies in the Philippines, oral rehydration therapy was supported by education of mothers in nutrition. The mothers, who came to seek advice on the treatment of their children, were advised how to proceed with oral rehydration, how to feed the child during the diarrhoeal episode and how to prepare available food for it after recovery. The advice on nutrition comprised continuation of breast feeding, how to improve the diet and safe food handling. The contact established between the mothers and the health service staff was used to treat the actual bout of diarrhoea, to see that it was not repeated and to ensure that the state of health of the child improved through improved nutritional practices. This proved rewarding and successful.
This indicates that an oral rehydration programme should be supported by education in nutrition. The task of introducing administration of oral rehydration in the home, within the context of primary health care, may look simple but the effective application of this simple and inexpensive treatment in daily practice to large masses of the population remains a crucial problem in the delivery of primary health care.

4.1.2 Sanitation measures supported by health education

The provision of sanitary facilities will prove ineffective in the control of diarrhoeal diseases unless people have learned how to use and maintain them. Similarly, efforts to educate the community in the use of water are unproductive if it is not available in adequate quantity. Neither sanitation nor health education, therefore, can stand by itself but must be applied within the context of primary health care. Simple sanitary measures for excreta disposal, use of water, control of food contamination, etc., can be effective in the control of enteric infections. Most of those measures can be introduced by improving local practice but some may require certain resources and investment. However poor the community may be, it is always possible to do something. Techniques and approaches will necessarily vary from one community to another; from the highlands of Papua New Guinea to the shores of the Pacific atolls, or the suburbs of the large cities. In some places, public health nurses and physicians may administer the programme; in others, voluntary workers, barefoot doctors or school teachers. The most important contribution will always come from the community itself.

There are many ways and a variety of approaches to achieve the same goal and there is scope for exchange of experiences in this field among Member States.

4.2 Levels other than that of primary health care

To formulate an effective control programme, essential health statistical data are needed on the incidence of various diarrhoeal diseases in various population groups, so that priorities can be determined. A system of epidemiological surveillance will provide current information enabling the rapid institution of appropriate control measures. Laboratory diagnostic services and central reference laboratories, for identifying microorganisms and determining their drug resistance patterns, will provide further useful information. When surveillance and laboratory services are not available there are usually sufficient clinical and epidemiological data to allow a reasonable control programme to be established.

At the central level, supply services are needed so that requirements for rehydration powder and intravenous solutions, disinfectants, drugs, and possibly vaccines, can be met.

Last but not least, a focal point is needed where information received can be analyzed and interpreted and plans of action, for an emergency or for a long-term programme, can be established. Such a focal point at
national level should attempt to develop a national strategy for the control of diarrhoeal diseases, corresponding to the needs of the country, the epidemiological features of the diseases and the available resources for their control. Cost-effectiveness and cost-benefit analyses of various alternative control programmes should be considered. Simple methods for such analyses exist, but for long-term planning more sophisticated techniques, such as mathematical models, may be required. An epidemiological (mathematical) model on typhoid has actually been used in planning the control of diarrhoeal diseases in Samoa. The use of models is neither costly nor difficult in view of rapid advances in computer technology and its wider application. There are several other ways of assessing the cost-effectiveness and the cost-benefit of control measures; it should always be possible to use one of them.

Whatever techniques are used or programmes adopted, there will be a need for a central or regional health service structure to (a) formulate a diarrhoeal disease control programme and (b) evaluate it.

5. PRESENT PROGRAMMES DIRECTED TOWARDS THE SOLUTION OF THE PROBLEM

5.1 Country programmes

Member States have developed programmes for the control of diarrhoeal diseases following a variety of principles and practices. They have given them greater or lesser priority in their systems of health care. Usually, cholera is given high priority because of the dramatic situations its occurrence creates and the economic consequences. Some countries or areas, especially those depending on the tourist trade, have given high priority to typhoid control. The control of other diarrhoeal diseases, although their incidence is much more frequent and they cause more deaths than cholera or typhoid, is usually not given high priority.

At present emphasis has been placed on the wide use of oral rehydration, supported by health education and sanitation measures. WHO has recently made a new effort towards the control of diarrhoeal diseases with the primary aim of stimulating more Member States to use modern technology and to develop national programmes. It is collaborating with Member States in initiating such national programmes.

In setting up a programme a country, having assessed the groups at high risk, should decide on priorities and on the groups that must be covered by such a programme. The following groups are generally considered to be those at high risk: young children, debilitated and old persons, poor and malnourished children, artificially fed infants, low birth weight infants, children being weaned or recently weaned, and pregnant and lactating women.

An important consideration should be how best to integrate diarrhoeal disease control activities with those for the promotion of maternal and child health, nutrition, family planning, environmental sanitation and
health education. At the periphery all those activities should be
delivered in harmony, essentially by the same primary health care worker,
though, in most instances it has to be the mother herself.

5.2 Regional programmes

An expanded regional programme for the control of diarrhoeal diseases
is being considered; the present discussion may give guidance as to the
further course of action. However, numerous activities in this field have
taken place in the past.

Training activities have included a course on enteric bacteriology,
including cholera; a recent workshop on cholera organized by the South
Pacific Commission with financial and consultant support from WHO, and
national workshops on oral rehydration in Papua New Guinea and the
Philippines. The training stimulated interest in the diarrhoeal diseases
and provided new knowledge on techniques and ways and means of controlling
them. Numerous documents and publications on the subject, including those
listed in the references to the present document, have been widely
distributed.

Oral rehydration powder has been supplied to Member States through the
United Nations Children's Fund (UNICEF) for pilot studies and to initiate
national control programmes.

A surveillance programme on shigellosis and the resistance of
enterobacteriaceae has been undertaken with the assistance of the National
Institute of Health, Tokyo, Japan. A number of countries in the Western
Pacific and South-East Asian Regions of WHO took part in the programme. It
was possible to undertake an assessment of the magnitude of the problem of
resistance.

Emergency assistance has been provided during outbreaks of cholera.
Recently such assistance was given to Gilbert Islands, an area which was
invaded by cholera for the first time in known history. The significance
of this fact, the possibility that Gilbert Islands may remain an endemic
focus of the disease, and the potential danger for other islands in the
Pacific, is fully appreciated.

Research programmes have been actively pursued. The joint
Philippines-Japan-WHO research programme on cholera is worth mentioning in
particular. Most of the new knowledge on cholera stems from that research
programme. It includes information on the effectiveness of various types
of vaccine; dosage; methods of immunization; microbiological
resistance; long-term carriers; survival of vibrios; and
many other facets of cholera and its control.

When cholera invaded Hong Kong in 1961, several epidemiological
studies on the spread of cholera were carried out which elucidated the mode
of transmission under local conditions. The role of food and water was
demonstrated. Epidemiological methods were improved through the
bacteriological examination of night soil for sources of infection.
A long-term basic research programme on cholera has also been established between Japan and the United States of America.

A study of the effectiveness of one-versus-two doses of acetone inactivated parenteral typhoid vaccine was carried out in Tonga. 13

Numerous other national activities in applied and operational research and international studies have been sponsored by WHO.

The Western Pacific Advisory Committee on Medical Research (WPACMR) has proposed that basic research be carried out on the pathophysiology of diarrhoeal diseases at cell and molecular level, and that studies be initiated on the human immune response to microbial invasion and the action of enterotoxins.

A working group on enteric infections met from 8 to 10 May 1978. It reviewed the present status of diarrhoeal diseases and outlined priorities for further studies on the control of those infections. The group emphasized the need for operational research on the delivery of oral rehydration and the introduction of simple sanitary measures within the framework of primary health care. It formulated a number of detailed proposals.

6. STRATEGY FOR FUTURE ACTION

The application, within the context of primary health care, of available technology for the prevention and treatment of diarrhoeal diseases, namely rehydration therapy and sanitary measures, supported by health education, requires an appropriate strategy and plan of action.

In view of the fact that the diarrhoeal diseases present both health and economic problems and that other sectors of public life besides the health sector are involved in solving those problems, the development of a strategy should be approached from a broad socio-economic point of view and not merely from that of health services and medical technology.

An effective strategy and a successful programme will be aimed at obtaining the support of the community and of the political leadership, together with their active participation in the programme.

Since a variety of social structures and economic, ecological and other conditions is involved, it would be improper to lay down strict rules on the details of each step of the programme that should be followed. However, it may be useful to outline some important elements of an effective strategy and an effective programme.

Strategy should be based on sound epidemiological principles. Epidemiological patterns of disease must be known and understood. High risk groups and the mode of spread must be determined in order to establish priorities and ensure that resources are used in the best possible way.
Epidemiological studies on modes of transmission are crucial for the formulation of an effective control programme. The textbook notion of the overwhelming role of drinking water in the transmission of typhoid, based on the experience of developed countries in the past, is not necessarily true for the Pacific Islands, where food-borne infections are now much more frequent. Consequently, in a typhoid control programme for those islands, improvement of the water supply should be supported by a vigorous effort to control the spread of the disease through food.

One of the principles of a strategy must be a sustained, long-term effort and not a "crash campaign". A programme must be commensurate with the available resources and the cost-effectiveness of the programme must be assessed. Grafting a diarrhoeal disease control programme onto national cleanliness, "well baby", or similar programmes may be worthwhile, as would integrating it with other health programmes.

A programme should be established in clear terms as to its aims, the technology to be used and its methods of work, taking account of logistics. Evaluation should serve as the basis for continuous improvement of such a programme.

The following elements of a national programme require particular attention:

(i) training;
(ii) community cooperation;
(iii) logistical support; and
(iv) operational research.

Nations having the necessary resources may be able and willing to undertake or to support basic and applied research; which adds a fifth element.

6.1 Training

Most health service personnel lack knowledge of recent advances in the technology of the treatment and control of diarrhoeal diseases. This should be introduced into the regular curricula of schools for various health workers. For those who are already in the field, refresher training should be provided, through courses, seminars and/or the provision of relevant publications. At intercountry and/or country level, special short seminars could be organized to train health workers, who would, in turn, teach others. Practical demonstrations and field work should constitute part of such training.

The importance of training cannot be overemphasized, as well-trained health workers are the best guarantee for the success of a programme. At national and regional level, it is useful to constitute a pool of experts and teams composed of clinicians, epidemiologists, sanitary engineers, bacteriologists, etc., who will be able to assist in carrying out long-term programmes and to help in the event of an emergency, such as an outbreak of cholera.
The development of demonstration areas and pilot studies is of great importance in training staff and arriving at innovative approaches.

6.2 Community cooperation

As the control and treatment of diarrhoeal diseases have to be undertaken at family level, on a daily basis, it is obvious that no programme can be carried out by primary health workers alone; they are too few in number for such a task. It is the community, the mothers in the first instance, who have to take the most active part in implementing a programme for diarrhoeal disease control. The programme will depend entirely on the success or failure of the development of primary health care delivery, and on the degree of acceptance and participation by the community.

It is of importance to have the cooperation of professions other than the health professions, such as school teachers, engineers, agricultural experts or anthropologists, to help in (i) winning the cooperation and participation of the community; and (ii) carrying out specific tasks for which they are particularly qualified and suitable.

At intercountry and/or country level, an exchange of experience through visits of teams of experts, and possibly training in primary health care, particularly in methods for and means of arriving at community participation, would be very useful.

6.3 Logistical support

Any programme for the control of diarrhoeal diseases needs certain logistical support. Oral rehydration is not possible without a sufficient amount of inexpensive powder mixture being readily available for the use of families. Professional training and education of the public can be better carried out with audiovisual and other aids. Other supplies are also needed for the programme to be carried out as planned. Once having made a decision and a firm commitment to do so, the authorities of most countries or areas would be able to provide the necessary logistical support.

Cooperation from other countries and from WHO, UNICEF and other agencies might be needed by some countries or areas, at least in the initial period before they reach self-reliance. Self-reliance must be the aim of all long-term programmes based on the extensive application of methods for the prevention and treatment of diarrhoeal diseases.

6.4 Operational research

Operational studies on the feasibility of oral rehydration in various ecological and socio-economic circumstances are indicated, before embarking on large scale operations. Similarly, the most effective ways and means of obtaining the cooperation of the community in the delivery of oral rehydration should be determined through operational studies.
A diarrhoeal disease programme, by its very nature, must be a large one, as it must embrace all the children of a country. Therefore, every element of the operation, such as the rehydration formula being a little more expensive, professional services being provided when voluntary aids could do the work etc., could amount over long periods of time to a considerable amount of money. Wastage of resources and effort could be prevented by carrying out research, aimed at streamlining the operation and making it more effective and less costly. Thus full use could be made of whatever resources are available for the programme.

Operational research must be considered the backbone of the effort to select, from among many options, the most effective and the least costly and accordingly to set up a successful control programme.

Behavioural and sociological studies on factors determining breast feeding patterns need to be undertaken, with the aim of using the findings for the promotion of breast feeding.

6.5 Basic and applied research

Some countries, especially the developed ones, have resources to carry out basic and applied research in the field of diarrhoeal diseases and they should do so. Basic research on physiology and immune response, and in other fields, can ultimately prove very useful and needs to be pursued. For the control of diarrhoeal diseases, however, applied research remains of great importance.

Applied research programmes are needed, consisting of epidemiological studies in high risk populations, and microbiological studies on the role of viruses in diarrhoea, on the pathophysiology of utilizing sucrose instead of glucose in oral rehydration (to simplify that therapy and make its application at home more practical) and on many other relevant subjects. Treatment, as well as control measures, could be made simpler, less expensive, and more accessible. Studies are needed on the effectiveness of various systems for the surveillance of causative organisms and their resistance, in order to arrive at more effective and less expensive methods.

The role of the WPACMR, as well as collaborating institutions and reference laboratories in the field of basic and applied research, is evident and further support to the institutions and laboratories is desirable.

Each country or area has to develop its own programme for research on diarrhoeal diseases. The regional programme will support national efforts and international collaboration, since many countries are not able to embark on difficult and costly research activities with the modest means available to them.

7. CONCLUSIONS

Diarrhoeal diseases are a major public health problem with far-reaching nutritional, economic and social implications. Advances in technology, namely in oral rehydration therapy, have made it possible to
control those diseases, provided well-thought-out strategies are developed within the concept of primary health care and sustained efforts are made towards long-term control programmes. Such programmes should be based on the national epidemiological situation, and the needs and resources of the country. They should be integrated into the primary health care delivery system. WHO and other agencies could cooperate in intensifying the development of national programmes through training, the provision of logistical support and the initiation and support of research activities.

8. REFERENCES


6. Second report of a field trial by an international study group (in preparation)


ANNEX 1

WORKING GROUP ON ENTERIC INFECTIONS

Manila, 8-10 May 1978

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