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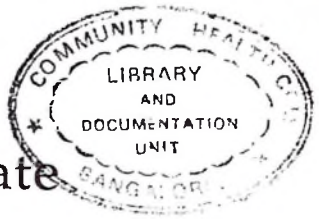

Theme: Integration

Technical Literature Update on DIARRHEA

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Vol. VIII, N°3 1993

Integration

The movement in child survival efforts is toward integration. BASICS, the Agency for International Development's new child survival project, which will manage the activities of the current diarrhea, immunization, and health communications projects (PRITECH, REACH, and HealthCom), is integrated. In addition, the WHO/CDR program has been developing its "sick child initiative," which stresses the desirability of an integrated approach to sick children. The program will seek to integrate diarrhea and acute respiratory infection (ARI) case management with a broader assessment and management of the child, including nutrition. Many African health ministries have sought to add diarrheal disease control (CDD) programs organizationally to their primary care units, and have combined CDD operationally with other maternal and child health activities in the implementation of supervision, training, information systems, and other field and central functions. Diarrheal disease control efforts have long given priority to the close interaction between diarrhea and nutrition.

This issue of the *Technical Literature Update* is the last under PRITECH direction, and fittingly seeks to explore some of the issues facing the integration of diarrheal disease control and oral rehydration therapy with other elements of child survival and primary health care. The articles raise the question of a variable mix of interventions depending on local epidemiology, discuss the tension between selective primary health care and comprehensive primary health care and whether they are different in practice, and analyze the potential and actual impact of integrated programs.

PRITECH

Management Sciences for Health

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Hirschhorn, N.; Grabowsky, M.; Houston, R.; and Steinglass, R. "ARE WE IGNORING DIFFERENT LEVELS OF MORTALITY IN THE PRIMARY HEALTH CARE DEBATE?" ***Health Policy and Planning*****, vol. 4, 1989, 343-53.**
Order #3298

Summary

Critics compare selective primary health care to comprehensive primary health care, and say that the former is top-down and fixed in nature, not responding flexibly to variations in local conditions. Selective primary health care is often militaristic, with minimum attention to community empowerment. It creates dependence and does little to build sustainable health care at the community level. Its narrow focus on infectious diseases ignores the social, economic, and nutritional antecedents of infections. Children saved from today's illness by selective primary health care may die tomorrow of something else (replacement mortality).

The authors describe a more flexible and responsive selective primary health care. They analyzed published infant mortality rates (IMRs) and specific mortality causes in a number of countries at various stages of development in health. The analysis showed that, as IMR falls, deaths from diarrhea first increase proportionally, then decrease, while neonatal tetanus deaths fall, then essentially disappear at low IMR levels. Measles is prominent at high IMRs, along with other parasitic and infectious illnesses including malaria, but decreases in proportional importance at lower IMRs. Nutrition-related deaths similarly decrease in importance. Perinatal and respiratory deaths remain proportionally constant. Thus, at low IMRs (59 to 24), the total number of defined causes contributing substantially to death declines, with perinatal deaths and diarrhea being the most prominent of the defined causes.

The authors draw the conclusion from these findings that selective primary health care programs should not consist of a fixed set of interventions, but should vary in programmatic content, according to the level of IMR and therefore the causes of mortality.

Thus, at high levels of IMR (240 to 120), the recommended components of selective primary health care should probably include vaccination against measles and neonatal tetanus; availability of antimicrobials for pneumonia, malaria, and dysentery; ORT for acute watery diarrhea; and vitamin A for measles treatment. All should be available at community and household level, because the health system is generally underdeveloped in situations having this level of IMR. This combination of interventions will both reduce IMR and initiate community-based primary health care with community health workers.

In areas with medium levels of IMR (119 to 60), ORT and nutrition programs, immunization, and programs to reduce low birth weight would be the priorities. In low IMR areas, antenatal care, health education and hygiene, water programs, and ORT would take priority as primary care interventions. As IMR decreases, integration of services within the primary level, and integration of the primary level with effective referral services at the secondary or tertiary level (e.g. support for underweight newborns) would also be needed to reduce infant mortality further, because of the more complex nature of its causes at this residual level of IMR. At the same time a lowered IMR from selective targeted programs may stimulate the increased political commitment to health needed to implement a true comprehensive primary health care system.

Editorial Comment

This article provides justification for the increasing importance of integration as health status improves. An unintegrated collection of interventions can make a substantial impact on mortality in high IMR areas, where there are many cases of a small group of simple problems manageable by comparatively simple interventions. As health levels improve, the simple responses to the simple problems will already be taking place. More complex service responses to both sick and well children, needing more complex support and management and integration in order to achieve greater biologic effectiveness and operational efficiency, will be needed if mortality is to be further lowered without overwhelming available resources.

Technical Literature Update

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Integration of interventions could enhance effectiveness and efficiency in high IMR areas as well. Integration of such services would be primarily horizontal, that is, across diseases and programs but essentially all at the primary care level. In a low IMR area, in contrast, further reductions in mortality would need planning for integration at different levels of health care services in addition to horizontal integration. For example, in perinatal care, establishing effective referral mechanisms such as screening for early identification of problems, communications, and transport would allow care at the primary level to be effectively integrated with services at secondary or tertiary levels for those mothers or infants requiring them. Decisions at all IMR levels of about whether to integrate certain interventions must primarily be determined on the basis of biologic and operational synergism: whether one intervention will biologically enhance the effectiveness of another (will hygiene enhance ORT, for instance, by reducing the number of diarrhea cases), and whether one intervention will fit operationally into or alongside another (such as vitamin A capsule distribution readily being joined with immunization).

The authors argue that, carried out in this flexible and responsive fashion, selective primary health care is not the monolithic, anti-community approach of which its critics complain. In fact, they say, even the more justifiably separate interventions appropriate to situations of high IMRs would be benefitted by greater emphasis on community involvement or training village health workers.

The study, based on data from many countries, draws attention to general patterns. These patterns should be valuable to international donor agencies developing approaches for many countries. Such patterns should not be overused in planning programs for an individual country, however. Special local social conditions, such as educational levels, climate or geography, economics, and existing health facilities, as well as local mortality and morbidity data, must be analyzed and incorporated in developing local plans.

Wisner, B. "GOBI VERSUS PHC: SOME DANGERS OF SELECTIVE PRIMARY HEALTH CARE." ***Social Science and Medicine*****, vol. 26, 1988, 963-69.**
Order #3287

Summary

This article targets for criticism the selective primary health care approach, for which UNICEF's GOBI strategy, as well as the PRITECH Project's even more focused emphasis on ORT, can be considered examples. Neither selective primary health care nor GOBI[1] has given priority to community participation and empowerment, even control, of health care. The interventions are chosen by external experts, not the people. They target individuals, in particular "ignorant" mothers. They lead to dependence on a health care system. In their effort to minimize costs and maximize impact they have utilized mass media social marketing and "massive ad hoc delivery systems." These approaches in particular undermine the formation of local grassroots organizations which join parents and primary health care workers in truly autonomous collaboration. The interventions also distract people from demanding that they be given what they themselves define as their needs. In addition, they distract people from efforts to overcome the obstacles imposed by factions of the privileged seeking to protect the status quo and keep the people in poverty.

Editorial Comment

Wisner's unstated goal, upon which most of his arguments are based, is the primary health care process, a movement which in a larger political context would be seen as akin to communism. In this movement, the people or community should be helped to assume the power to solve their own problems. The hierarchy inherent in a system in which a few people "control" the knowledge and skills needed to bring about good health is inherently bad, according to this approach, and must be reduced or if possible eliminated. If it were not for the evil controlling doctors, who are keeping the inherently simple knowledge and skills needed for their own use and profit, the people could deal with their health problems themselves. People have a right to health, he implies (not to health care but to health), presumably measured by the usual indicators of mortality and morbidity. He seems to contend that improving health via the politically appropriate pathway is more important than the health itself.

The goals of selective primary health care and GOBI, are, in contrast, clearly stated—better health, specifically the reduction of mortality of children. These approaches seek to achieve that by the most direct and rapid methods available. As the author notes, the selective primary health care movement arose in response to disappointments with the primary health care movement and with earlier efforts to improve developing country health systems as a whole. Despite substantial investment, these efforts, *when carried out on a large scale*, had not resulted in much impact on mortality. Children were still dying at about the same rates.

[1] GOBI consists of growth monitoring, oral rehydration therapy for diarrhea, breastfeeding, and immunization.

In my own experience, communities may not put health first, or may drift away into other endeavors, despite sincere efforts to facilitate their development of primary health care. Much effort can be made by governments without a corresponding response by the people, and therefore with minimal impact on mortality. Philosophically the comprehensive primary health care approach is attractive, just as communism and a managed economy were attractive to the founders of the Soviet Union. But put into practice in a variety of situations, the comprehensive primary health care approach is inconsistent at best in bringing about the hoped-for improvements in health, as measured in children's deaths. Because of this, the selective primary health care/GOBI approach chose a few effective and efficient interventions that could be implemented in a way which would circumvent the immense investment that comprehensive primary health care seemed to require, and still achieve major reductions in mortality.

I continue to believe that this logic is valid. We cannot willingly allow children to die in the name of comprehensive primary health care or any other philosophy, no matter how internally moral that philosophy may be. In some settings, human beings are able to manage the complex relationships and divisions of labor and education that are needed for sustainable PHC to take place, and to bring about better health. But in many communities this does not seem to be possible. A more dependency-producing, more controlled and controlling, less consensus-dependent system seems to be necessary to keep children from dying within available budgets in such circumstances.

Wisner makes a number of stimulating suggestions, in particular where he cites mechanisms by which we could enhance community and group involvement and use selective primary health care as the "leading edge" of primary health care. The following paper by Kendall on Honduras shows how this can happen. In the last few years, we have seen in a number of countries how governments and politicians have been stimulated to invest more in health and primary health care by the success of immunization days and aggressive breastfeeding programs, for example. Our future efforts must continue to seek ways to engage the community in health-generating activities while not jeopardizing those activities that keep children from dying today.

Kendall, C. "THE IMPLEMENTATION OF A DIARRHEAL DISEASE CONTROL PROGRAM IN HONDURAS: IS IT 'SELECTIVE PRIMARY HEALTH CARE' OR 'INTEGRATED PRIMARY HEALTH CARE?'" ***Social Science and Medicine,*** **vol. 27, 1988, 17-23.** ***Order #2175***

This article addresses the debate between integrated or comprehensive primary health care and selective primary health care. Kendall notes many of the same differences between the two as Wisner (above): concerned or not with the structure and organization of services and of communities, functioning exclusively within the health sector or involving other sectors in broad development, driven by epidemiologic and cost considerations versus considerations of social equity, emphasizing community participation or not, and narrowly focused on single interventions or aimed at broader institutional and health system development.

He finds, however, that in the effective implementation of selective primary health care as in the Honduran natinoal CDD program, the distinctions between the two approaches become much less clear. The initially more focused selective primary health care implementors were forced to respond to issues related to community involvement, strengthening of basic health system functions such as health education, management, supervision, and supply logistics, and problems in the underlying basic primary health care system (such as village health worker and community fatigue). The CDD program went beyond case management of diarrhea patients with ORT to engage actively in water and sanitation and hygiene activities, which of necessity involve the community if they are to be successful. The program worked through multi-purpose workers at the community level and professionals at all levels of the health care system, not through a dedicated vertical system of specialized workers.

Honduras had an integrated primary health care system in place, which had as many problems as successes. The CDD program had to work with those problems, and the problems of the primary health care system became the program's problems. In some cases it could bypass such problems. For example, it used radio to reach community members directly, thereby creating demand which in turn provided incentive for both the nurses and auxiliary health workers of the primary health care system. It used municipal mayors to distribute ORS, which subsequently led to a rekindling of interest by volunteer health workers in their work.

Kendall concludes that issues of design and utilization of services at local levels, obstacles to service delivery, household level integration, political and economic implications of health services, and other questions and problems are issues that cut across primary health care and selective primary health care. When these issues are addressed from the more practical perspective of implementation than from a purely theoretical perspective, they are more fruitful in organizing what we already know about primary health care and what we should address in our research than the theoretical debate that inappropriately codifies and polarizes them.

Editorial Comment

This article speaks for many of us with experience in the field. We find the theoretical debate between integrated or comprehensive primary health care and selective primary health care as expressed particularly in CDD programs frequently irrelevant as we struggle via our "vertical" program efforts to deal with problems of village level participation and communication, parental education, home versus health facility treatment, home solutions versus ORS packets, and the like. Yes, the integrated primary health care approach seems to emphasize a participatory, community-driven *process* of health care rather than *impact* on mortality, certainly more than most CDD programs do. Yet CDD programs must ultimately face the problems of sustainability, of poor health services coverage at least by government health workers, and of the need to get ORS or drugs for dysentery out to the community and delivered appropriately. All of these concerns lead the programs to become involved with communities and village health workers, as happened in Honduras.

Perhaps the most important characteristic of the Honduran situation was that the CDD project was implemented with a project to strengthen basic and primary health care services. Both will apparently continue to be funded by USAID. By working together and being integrated, the projects could address fundamental and joint problems.

In contrast, CDD or other child survival programs working in situations where governments and donors are not addressing basic health service problems may be too minimally funded to address even the most critical basic primary health care system problems adequately. This is true particularly if they are tightly constrained by their funding sources to address only the problems and activities of the particular disease control program. To be successful, both donors and host governments must recognize and provide support for activities aimed at integrated problem solving in addition to the pure selective primary health care program activities which are their main focus. Collaboration with the basic primary health care systems of the health ministry and the private sector and its primary health care services, will both assist the targeted selected primary health care program in meeting its objectives, and help to solve the problems and achieve the philosophical goals of the underlying integrated primary health care system.

Black, R.E. "WOULD CONTROL OF CHILDHOOD INFECTIOUS DISEASE REDUCE MALNUTRITION?" *Acta Paediatrica Scandavica*, supplement, vol. 374, 1991, 133-40.
Order #5191

Pediatric infections have long been recognized as important influences on the physical growth of children and the nutritional status and rates of malnutrition in populations. Particular infectious diseases, such as diarrhea, measles, respiratory diseases, and malaria, have been identified as probable determinants of growth in seminal studies in various settings. The studies examined in this review article were mostly studies of the frequent childhood infectious diseases of developing countries, especially diarrhea and respiratory diseases. In some studies, measles, malaria, skin infections and other illness categories were also included.

Examples: (1) Seven hundred sixteen Guatemalan children under seven years of age were followed for 23 months. Illness histories were collected every two weeks and related to 6 monthly and yearly increments in weight and height. The percentage of days ill with diarrhea was found to be significantly associated with reduced gains in weight and height. Respiratory illnesses, which were present 30-35% of the time in the first four years of life, were not associated with reduced growth outcomes.

(2) In The Gambia, 152 children 3-36 months of age were studied for one year. Diarrhea was demonstrated to be significantly related to reduced increments in weight and height. Malaria prevalence adversely affected weight gain, but not linear growth. Other categories of infections, including upper and lower respiratory tract infections, were not found to affect growth significantly in this population of children.

(3) A longitudinal study in Uganda involving 45 children less than 3 years of age showed the

occurrence of diarrhea to be significantly associated with reduced weight gain. Diagnosed malaria and fever of unknown origin were also associated with reduced weight gain. Other disease categories, such as upper and lower respiratory illness and skin infections, were not associated with adverse growth outcomes.

When infectious diseases and routine dietary intake have been evaluated simultaneously, inadequate dietary intake rather than the infectious disease per se was found to have the predominant role in growth faltering. In many cases another bout of disease—frequently diarrheal disease—overtakes the child before the initial "catch-up" period has been completed, preventing by poor appetite the increased food intake needed. The magnitude of effect of diarrheal diseases on growth is difficult to estimate since effects ranging from 10-80% of the growth retardation in the first few years of life have been reported.

This variability in the observed effects may be explained in part by the presence of other factors that modify the potential effect of diarrhea, and possibly other infectious diseases. Control of infectious disease through prevention or proper case management can be justified for itself, but is not as cost effective in improving nutritional status and reducing malnutrition as more direct nutritional interventions such as breastfeeding support, dietary supplementation, or convalescent feeding approaches.

Lutter, C.K.; Mora, J.O.; Habicht, J-P. et al.
"NUTRITIONAL SUPPLEMENTATION: EFFECTS ON CHILD STUNTING BECAUSE OF DIARRHEA,"
***American Journal of Clinical Nutrition*, vol. 50, 1989, 1-8.**
Order #3296

Research has demonstrated that the positive effect of nutritional supplementation on child growth in malnourished children is small relative to the large negative effect of diarrheal disease. Length and diarrheal morbidity were compared at 36 months of age for two cohorts of Colombian children, testing the hypothesis that routine dietary supplementation can modify the negative effect of diarrhea on height. Among unsupplemented children, diarrhea was negatively associated with length, that is, children with more diarrhea were more frequently stunted. Among supplemented children, in contrast, diarrhea had no effect on length: the supplementation appeared to offset the stunting effect of diarrheal disease completely. The authors recommend targeting food supplementation programs to the critical period of high diarrheal prevalence among infants and young children in order to increase the effectiveness of such programs in preventing growth retardation.

Editorial Comment

The Lutter study is powerful evidence of the importance of integrated programs in controlling one of the most important negative effects of diarrhea, its effect on nutrition and growth, bearing out the conclusions of Black in the previous summary. A subsequent study from Peru, detailed in an abstract by Kenneth Brown and colleagues (FASEB Journal, vol. 5, A1079, 1991) examined a very similar question, whether having an adequate basic diet as compared to a deficient diet would influence the negative effects of diarrhea on growth. One would presume that diets of the children receiving supplements in the Lutter et al study would be considered "adequate" according to Brown's criteria. They used weight gain rather than length as their indicator.

Brown reported that those children whose regular dietary energy intake was greater than 75% of their recommended intake showed no relationship between diarrhea prevalence and weight gain, while children with energy intakes less than 75% of recommended levels did show poorer weight gain with greater diarrhea prevalence. This study confirms that having an adequate diet can offset the negative results of diarrheal disease on growth, both with regard to weight and length.

In both situations the critical action—adequate feeding or food supplementation—had to occur between diarrhea episodes, and would not ordinarily be part of the usual CDD program concentrating on case management. One presumes that in most circumstances children receiving a supplement would be chosen through a process of growth monitoring. In such a fashion, growth monitoring followed by supplementation or effective maternal education on diet to the most needy children would act synergistically with ORT and adequate diarrhea case management to prevent nutritional damage from diarrhea. Integration of interventions in this manner, that is, strategically planned integration, can take advantage of these biological synergisms and indeed improve both the effectiveness and the efficiency of the well-chosen interventions.

Such strategically planned, integrated interventions are very likely the appropriate response to the problems

described by Black in the preceding summary. A pure ORT program, even one that tried to improve feeding during and immediately after the diarrhea episode, would probably not have the same effect.

Mosley, W.H.; Becker, S. "DEMOGRAPHIC MODELS FOR CHILD SURVIVAL AND IMPLICATIONS FOR HEALTH INTERVENTION PROGRAMMES." ***Health Policy and Planning*****, vol. 6, 1991, 218-33.**
Order #5151

Summary

The authors review available data on child mortality from the Asia-Near East region. Major declines in child mortality have occurred over the last two decades. Some of this improvement occurred prior to the more intensive child survival and primary health care efforts of the last decade. Evidence from Demographic and Health Surveys and other sources, however, shows substantial correlation between mortality decline and increasing utilization (coverage) of primary health care services, particularly immunization. Further declines in mortality can be expected in the near future, also related to the effects of preventive interventions of the sort UNICEF and USAID have supported through their child survival strategies.

But much work remains to be done. A substantial decline in mortality has not occurred in all of the countries of the region; some will probably not achieve the WHO/UNICEF mortality target of 70 per thousand (expressed as probability of dying by age 5) by the year 2000, for example, Bangladesh. For the region overall, the total numbers of deaths of children under 5 will remain substantial—between 4 and 5 million per year, only 20 to 40 percent less than current numbers. And the relatively constant numbers of annual births projected along with declining deaths will lead to a gradually increasing number of children needing services. Thus maintaining current levels of support for child survival will be needed just to consolidate and maintain the health gains already achieved, while further reductions in child mortality will require increases in the current levels of service.

Critical to success, say the authors, will be strategies to improve program efficiency and effectiveness, most fundamentally those that combine interventions. For example, combining ORS/ORT with interventions to improve personal hygiene will have a multiplier effect. ORS will become more efficient because hygiene has reduced the number of cases, and hygiene will be more effective in mortality reduction because those cases of diarrhea that do occur despite better hygiene can be provided with a lifesaving intervention. Targeting interventions to high-risk groups will further increase the efficiency of the interventions. Operations research to improve existing interventions, developmental research to generate new appropriate technologies, and more consistent investment in evaluation research to document the demographic impact of interventions, are needed to further strengthen existing efforts.

Editorial Comment

This article stresses the continuing need for child survival services, even in the Asia-Near East region where so much progress has already taken place. Its data and projections show clearly that continuing support from governments and donors will be needed just to maintain existing health gains. It is not time to shift health dollars into care for adults. Further reductions in mortality will demand either an increased level of support, or an increase in the efficiency and effectiveness of the current level of interventions.

In this scenario, integration of interventions that takes advantage of the synergy between diseases (such as vitamin A deficiency and measles), or in some cases the operational synergy between interventions (such as vitamin A distribution carried out at the same time as immunization), is unavoidable if further progress is to be made within the limitations of available resources. Like Taylor and Parker (see below), these authors recommend starting with a small package of activities or even a single intervention, and later expanding and integrating others as the initial intervention solves its problems and becomes institutionalized. The challenge to those working with the child survival interventions is to differentiate between those situations where more problem solving within a single intervention is still the priority, and those situations where the priority should shift to adding and integrating new interventions which can be synergistic with the ongoing intervention.

Taylor, C.E.; Parker, R.L. "INTEGRATING PHC SERVICES: EVIDENCE FROM NARANGWAL, INDIA." ***Health Policy and Planning*****, vol. 2, 1987, 150-61.**
Order #3580

Summary

This paper reviews the findings from Narangwal in North India, where different combinations or packages of nutrition, infection control, family planning, women's

health, and children's health services were introduced into different sets of villages. The investigators collected data to measure inputs and costs, changes in health-related practices, and impact on morbidity, mortality, growth, psychomotor development, and fertility. Significant reductions occurred in morbidity and mortality in children and their growth improved in experimental villages receiving nutrition and/or infection control services compared to control villages. Family planning use increased in all villages receiving family planning inputs. The combined cost of services was about $US 2.00 per capita (1971 prices).

Integrated or combined services generally performed at least as well as more selective approaches, and because of their integrated nature were often more efficient. The major advantage of integrated services was that they provided multiple benefits, an important consideration in areas with many competing causes of morbidity and mortality. It was concluded that Narangwal demonstrated the potential of an incremental approach to integration, based on a process of learning by experience and supported by the continuous feedback of information from both formal and informal assessments.

Editorial Comment

This general review can only touch on the rich store of information that can be learned from the Narangwal experience, and reminds us again of how often we seem to have to keep re-learning what has been demonstrated clearly in the past but forgotten. The Narangwal project used a classic primary health care structure involving village volunteers and family health workers who lived in the village, supported by supervisory doctors and nurses who received referrals for problems unable to be handled by the village-level manpower.

While the services were integrated in terms of their delivery, they were not uniformly provided to the whole population. Instead, surveillance and screening identified children with high-risk, early problems which could become severe, or greater need, and intensive services were directed at these targeted cases. By integrating such surveillance and screening as well as the subsequent services, the program could identify and respond to multiple kinds of problems, not just one. The result was a significant impact on health problems at a feasible cost.

I was struck by the statement that family health workers spent only half the time on certain services in villages where the services were integrated (such as nutrition with health care) as they did in single-service villages. That may mean that all children got less of a particular service, or that the average was less, which could mean that some problem children got lots of service while others got almost none. In this overview article the data to clarify this point are not available. Given that the services had already been trimmed down to the most critical, it seems likely that the latter was true, and that the increase in efficiency was obtained by shifting time spent by health workers from one particular task to another.

The authors comment that they delegated the tasks that could be readily standardized to the periphery, and kept the total package of interventions to a feasible level—5 or 6 interventions seemed to be manageable. These were then supported by a surveillance system to monitor the population and a supervisory/management/evaluation system with readily available consultation to monitor and support the workers.

The report confirms the importance of a well functioning management system to success, a factor shown to be crucial in the narrowest of selective primary health care programs as well as the broadest of primary health care efforts. Add to this a judicious limitation of services and activities selected for feasibility, delegation of the most standardized services to the periphery and to lower level workers, targeting of intensive services to those with the greatest need for them, and inclusion of an information system that identifies problems and supports their correction, and you have a program that can respond to the most important health problems of the community in a cost-effective manner.

Is such a program feasible on a national level? The authors urge an incremental approach, starting with a smaller package of activities and subsequently expanding. This is just where many countries are today, having functioning CDD and immunization programs running, usually through but sometimes in parallel with a basic health care system. Using Narangwal's example, we could incrementally expand those programs, adding in turn acute respiratory infections, vitamin A distribution, prenatal care, or targeting via growth monitoring, while not forgetting to strengthen the necessary supportive referral services. This approach would be preferable, in my view, to implementing a whole package of services at once but of necessity at a superficial level, and would be much more feasible for most countries. The key is not to forget the need for solid management to identify and solve the problems which will inevitably arise.

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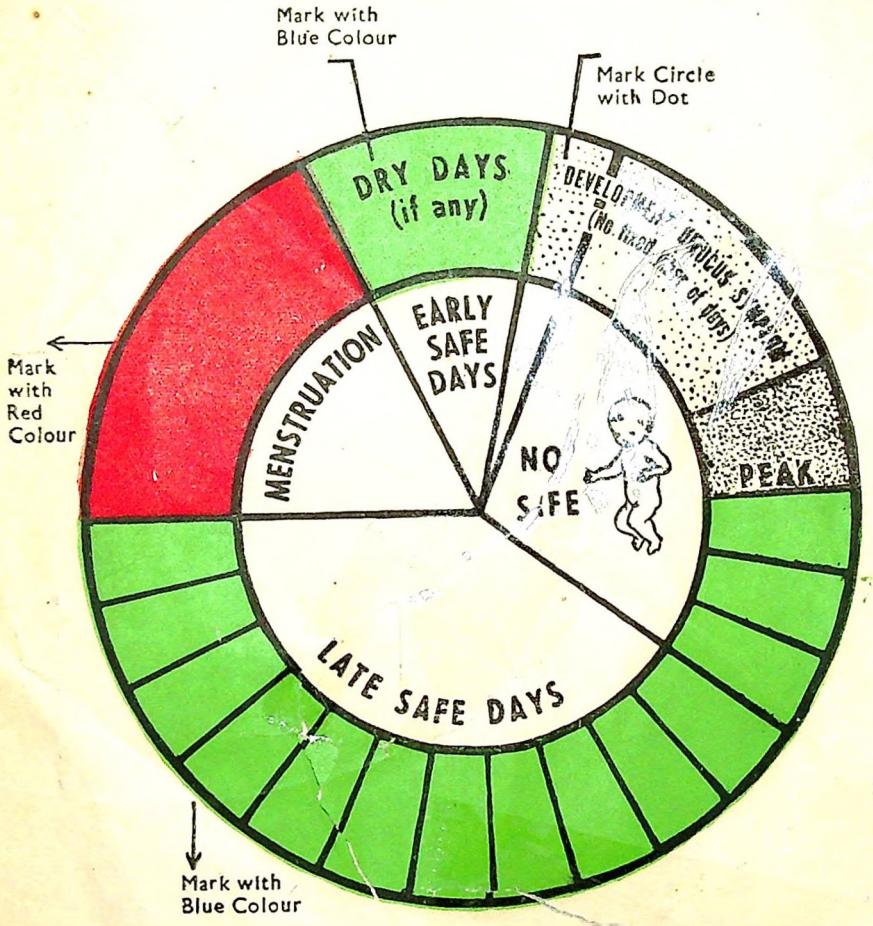
OVULATION METHOD CHART

(BILLINGS CERVICAL MUCUS METHOD)



FAMILY WELFARE SERVICE DEPT.
ST. JOHN'S MEDICAL COLLEGE HOSPITAL,
BANGALORE 560 034 *Phone : 565435*

Name :.. Centre :..

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CHARTING INSTRUCTIONS

The Ovulation Method (O.M.) of Family Planning (F.P.)

The O.M. is a natural method of F.P. (N.F.P.). It is based on the scientific fact that a women can only become pregnant when she is in her fertile period.

She can identify this fertile period easily by **certain signs** caused by the rise of female oestrogen (sex hormone) in her blood at this time. She does not need to be educated or have regular periods to use this method effectively.

These signs are :—

1. **Mucus** secretion from the cervical glands in the uterus (womb). This is **felt** as a **wet sensation** in the genital area.
2. The mucus may be also **seen** as a raw egg-white discharge at this time.
3. There is **pain** in the lower abdomen on one side felt as a sharp pain, or backache often going down the thigh.
4. The breast feels heavy, and there may be a dull pain.
5. There may be a little bleeding or brownish discharge called midmenstrual spotting
6. There maybe mood changes. **The strongest sign is the mucus.**

Charting to detect your fertile period.

Mark your chart daily at night. Colour red in the square on the days you menstruate.

Menstruation is usually followed by days of dryness. When the cervical glands begin to get stimulated by oestrogen they discharge a thick white secretion which marks the beginning of the fertile period and the woman begins to feel **wet**. Then it becomes thin and transluscent. (egg-white).

The wetness is a warning sign to the woman who wants to use the O.M. for F.P. She stops all genital contact with her husband. She abstains for all these **wet days** or whenever she sees the secretion. The last **wet** day is called the **Peak Day** and it is followed by Ovulation, **i. e. Day 1.**

The ovum may live upto 18 hours so she abstains on **Day 2** and **Day 3** for safety. By this time she becomes infertile and can resume intercourse. (The sperm or male egg can live upto 2 days in mucus.)

Start charting immediately in the square corresponding to the day of your cycle. For e g. the first day of your menstrual period is square 1. When you start a new cycle mark in this square (1) and write the date. Show your chart to a N.F.P. Teacher.

Mark Blue for **dry days** when **nothing** is felt. Mark O circle with a dot (sign of ovum) for wet days. Mark a X on Peak Day which you will only know on Day 1. Mark in 2 and 3 on the following 2 days.

This Natural Family Planning (NFP) method is safe, effective and acceptable to all couples.

30 P.

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NEWSLETTER

September 1979

DEPT. OF COMMUNITY MEDICINE
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ORAL REHYDRATION FOR ACUTE DIARRHEAL DISEASE

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In many developing countries 25-40% of children die before the age of five. Almost half of these deaths are due to diarrhea and dehydration, accompanied by malnutrition. Studies in Guatemala[1], India[2], and Indonesia[3] have shown that nearly every child has one or two attacks of diarrhea a year and 1-4% of these sick children die unless treated.[4]

Studies of severe diarrhea in cholera epidemics in Bangladesh[5] show that mortality can be reduced by 90% if family members are instructed in simple oral rehydration measures.

In oral rehydration, sugar and various salts are mixed with water and fed by mouth. The salts and water are intended to compensate for that lost with the diarrhea and the sugar is added to improve the absorption of the salts by the intestine.

The rehydration fluid, which must be made up fresh each day, can be as simple as a teaspoonful of salt and four of sugar dissolved in a quart of boiled water, or the same ingredients measured out by a special plastic spoon promoted by the Institute of Child Health[6] in London. More complex mixtures recommended by WHO are also available. (See Table 1). They are available in separate aluminum foil packages for long shelf life (Oralyte $0.12/L) or more cheaply in a tin given to the village health worker for individual distribution using a measuring scoop. Studies comparing the cost and therapeutic effectiveness of these different solutions have not yet been published.

In the January 1979 L.I.F.E. Newsletter a rehydration recipe was given using lactose (milk-sugar) and gelatin. On theoretical grounds this formula would not receive wide acceptance since the enzyme splitting lactose into glucose and galactose is often severely diminished in diarrheal diseases. Furthermore, neither ingredient is readily available in developing countries.

Simple, early rehydration measures are the crux of good therapy and need to be taught by village health workers and school teachers to all mothers and others who may be caring for small children. They must be advised that while oral rehydration may appear to increase the stool losses or even cause vomiting, yet it is important to persist, getting the child to drink one cup (200-500 ml) of the fluid for each stool passed, while the adult should double that quantity.

While oral rehydration at home is the most effective therapy for 90-95% of children and adults with acute diarrheal diseases, there are some circumstances which health workers and mothers must learn to recognize where hospitalization is necessary. (See Table 2).

TABLE 1

'Oralyte', a glucose electrolyte, oral rehydration solution, recommended by WHO

Na Cl (salt)	3.5 gms	Na+	90 meq/L
$NaHCO_3$ (baking soda)	2.5 gms	HCO_3^-	30 meq/L
K Cl	1.5 gms	K+	20 meq/L
Glucose	20 gms	Cl-	80 meq/L
Water	1 L	Glucose	110 mmol/L

TABLE 2[7]

1. Patients with severe dehydration, with hypotension, shock, stupor, or coma. These patients need very rapid water and salt replacement.

2. Patients who cannot drink because of fatigue, stupor, or sustained vomiting.

3. Patients with sustained oliguria (<700 ml of urine/day in an adult and <20 ml/kg/day in a child). These patients need very precise fluid replacement.

4. Infants less than one month of age; such infants dehydrate very rapidly.

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COCONUT CHERRY CUBES

In Sri Lanka a tasty jelly-like dessert is being made from coconut water which was previously thrown away as a waste product. Based on a traditional Philippine dish, Nata de Coco, this product is obtained by growing the bacterium, Acetobacter xylinum, in sugared coconut water. In addition to coconut water, various other fruits of Sri Lanka, such as mango, guava, pineapple, papaw, and wood apple, can also be used. A production, demonstration, and training unit has already been established to popularize this product and to promote this industry. Further information is available from: Industrial Development Board; PO Box 9; Moratuwa, Sri Lanka

(Excerpted from the June 1979 issue of Technonet Asia Digest - Supplement of Technonet Asia Newsletter.)

INTERESTED IN RURAL WATER SUPPLY?

The National Water Well Association (NWWA) is looking for people who would be interested in receiving training materials pertaining to rural water supply and sanitation systems appropriate for developing countries. These materials will be developed as part of the National Demonstration Water Project, funded by the U.S. Agency for International Development. To be available early in 1981, the materials should be useful to people responsible for water supplies. If you are interested, or know of someone who might benefit from this information, please contact: Anne E. Simmons, Information Coordinator; National Water Well Association; 500 West Wilson Bridge Road; Worthington, Ohio 43085 USA

GHANA'S NATIONAL RABBIT PROJECT

Rabbit breeding appears to be an attractive proposition for meat production in a developing country. It has been estimated that the backyard breeder who invests $8 each for a buck and a doe can furnish his family with a supply of meat, over the course of a year, equivalent to the weight of an entire cow. Another advantage is the rabbit's omnivorous eating habits. The diet may include table scraps, sugarcane waste, various grasses, groundnut and sweet potato vines, dried cassava, and brewer's mash.

After more than six years of patient groundwork, Ghana's National Rabbit Project seems finally to have gathered momentum to the point where scarcity of breeding rabbits is more of a problem than lack of either official or popular support. The rabbit's potential role in Ghana's drive toward food self-sufficiency has become the beneficiary of a massive media campaign, complete with radio jingles ("get the bunny money"), television spots, and posters designed by local artists.

Ghana currently produces all of its own rice and nearly all of the maize required for its 9.5 million population, but animal protein is another matter. What meat does reach the market is usually priced far beyond most family budgets.

In 1972 Newlove Mamattah, using a grant from Ghana's National Redemption Council and technical help from the US organization Technoserve, set up a 32-ha farm with an initial breeding stock of 80 animals. By the end of 1977 a survey of registered breeders put the basic rabbit population at 13,948.

Now rabbit breeding is on school curricula and rabbit on school menus. Would-be rabbit raisers must take an intensive three-day course in rabbit husbandry to qualify for the purchase of breeding stock. And the demand for breeding stock is so strong that supply is unable to keep pace.

(Excerpted by 'cerescope' in Ceres, May-June 1979.)

ANNUAL REPORT ON RICE UTILIZATION NOW AVAILABLE

Rice Report 1977. Annual Report of World Research and Development on the Post-Harvest Utilization of Rice (Working Party on Rice Utilization, International Union of Food Science and Technology, 1978, 287 pp, paperback). This is a report of the scientific and technical activities of centers and organizations around the world relative to new techniques in post-harvest rice utilization derived from research and industrial development. It includes information on storage, processing, and nutritive value of milled rice as well as on rice by-products, such as rice bran and rice husks. Processing technology ranges from that appropriate to home level to industrial scale.

Available from: Instituto de Agroquimica y Tecnologia de Alimentos; Jaime Roig 11; Valencia-10, Spain.

Practical advice for the prevention and treatment of Diarrhoea

CMAI ■ AHRTAG ■ UNICEF

Dialogue on Diarrhoea

PRACTICAL ADVICE FOR THE PREVENTION AND TREATMENT OF DIARRHOEA

CMAI AHRTAG UNICEF

FOREWORD

AHRTAG, UNICEF and CMAI together, are bringing out this edition which presents some of the best of the back issues of **"Dialogue on Diarrhoea"** for people in health work. I want to take the opportunity of thanking the editorial team at AHRTAG for giving CMAI this privilege and UNICEF for making funds available for the same.

This publication will be available to those interested and hopefully will contribute to improved child survival and health care. We would value your comments and feedback on this publication.

Dr. Daleep S. Mukarji
General Secretary
CMAI

CHRISTIAN MEDICAL ASSOCIATION OF INDIA
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Dialogue on Diarrhoea is a quarterly international newsletter which focuses on all aspects of the prevention and treatment of diarrhoeal diseases, and has been published in London by the Appropriate Health Resources and Technologies Action Group (AHRTAG) since 1980. The newsletter now has a worldwide readership of over 250,000 and is available in translation in French, Spanish, Portuguese, Arabic and Tamil editions. Future editions are planned in Bengali and Urdu. Readers who would like to know more about Dialogue on Diarrhoea should write to AHRTAG, 1 London Bridge Street. SEI 9SG, U.K.

Practical Advice for the Prevention and Treatment of Diarrhoea is a special compilation based on the best 'Practical Advice' pages from eight years publication of Dialogue on Diarrhoea. These pages cover a wide range of topics, from feeding the anorexic child, making soap and purifying water, to storing oral rehydration salts, developing health education materials and evaluating training. Produced in collaboration with and published by the Christian Medical Association of India and AHRTAG with support from UNICEF.

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How to recognize dehydration

Diarrhoea kills because it causes dehydration. The stools of a healthy child contain relatively little water but a child with diarrhoea passes very watery stools which also contain vital salts (sodium, sodium chloride, potassium and bicarbonate). If the losses are great, both the water and the salts must be replaced or the child will die. To recognize the signs of dehydration it is necessary to ask, look, feel and, if possible, weigh the child.

Important signs and symptoms

● **Stools** Ask about the number and size of the diarrhoea stools. Has there also been vomiting? These answers may also give clues to the severity of dehydration.

● **Thirst** This may be the earliest sign of dehydration. Until a child has lost more than five per cent of his body weight, dehydration causes few signs. When severely dehydrated, a child may not be fully conscious and may be unable to drink.

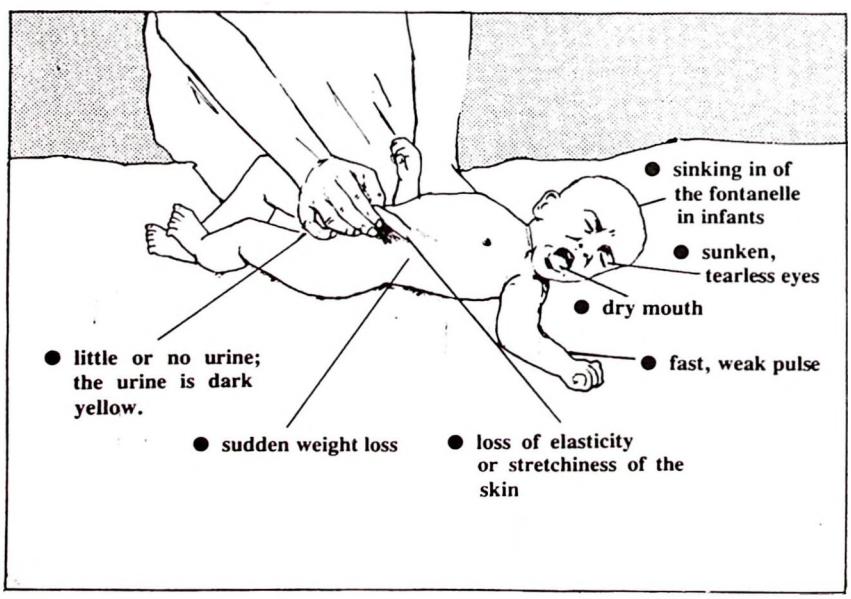
● **Urine** A healthy child usually passes urine about every three hours. The body of a dehydrated child tries to save water and only produces a small amount of dark coloured urine. Mothers usually know how much urine their children have passed, so ask them if there has been less that usual.

● **Condition** If there is no dehydration, a child will appear alert and well. At a later stage, he will be weak, irritable and may look unwell or sleepy. A severely dehydrated child may appear very sleepy or be unconscious. He may also have fits or convulsions.

● **Sunken eyes** A child's eyes lie in soft, wet, fatty tissue. If he becomes dehydrated, this tissue shrinks and becomes drier and his eyes sink back into his skull. His eyes also lose their shining appearance and stay half open when he is asleep.

● **Dry mouth** A dehydrated child cannot make enough saliva and so his mouth and tongue become dry. This is an important sign.

● **Breathing** Sometimes, a severely dehydrated child breathes fast and deeply. This kind of breathing occurs when a child has been dehydrated for some days or has been rehydrated with the wrong fluids. Do not mistake this deep, fast breathing for the shallow, rapid breathing of pneumonia.



● **Loss of skin elasticity** The skin of a healthy child is elastic. If you pinch the skin of the abdomen and then let go, the skin quickly flattens again. Dehydration makes a child's skin dry and less elastic so when pinched it sticks up for some seconds before going flat again. If a child is very thin or very fat, loss of skin elasticity is not easy to detect and therefore not a helpful sign in diagnosing dehydration.

● **Pulse** Dehydration makes a child's pulse faster and weaker. When he becomes severely dehydrated, it may not be possible to feel the pulse at the wrist, you may have to feel at the groin or listen to the heart. (With very severe dehydration, the pulse is sometimes slow).

A seriously dehydrated child.
Photograph courtesy of TALC

● **Sunken fontanelle** The fontanelle is the soft place between the bones at the top of a baby's skull. It is large when he is born but closes over by the time he is about 18 months old. When a baby becomes dehydrated, his brain and tissues in the skull lose water and shrink. The fontanelle sinks down between the bones of the skull.

● **Loss of weight** This may occur quickly during a few hours or over several days. A severely dehydrated child may have lost a tenth or more of his normal body weight. If he weighed ten kilograms before the onset of diarrhoea, he may have lost at least a kilo of water and may now weigh only nine kilograms. Loss of weight due to malnutrition occurs more slowly over several weeks or months.

Conclusion

Dehydrated children need urgent rehydration and should be encouraged to drink even if vomiting occurs. Those with severe dehydration and complications such as convulsions should be given oral rehydration fluid and taken to a centre where they can receive special care.

Simple laboratory investigations into diarrhoea

Tony Moody looks at the range of laboratory work that can be carried out at health centre level.

The complete investigation of diarrhoea requires complex and sophisticated laboratory techniques to isolate and characterize the causative agent. This does not exclude the laboratory worker with only simple, basic equipment from being able to provide useful information for the management of diarrhoea.

Essential laboratory equipment consists of:–

- a microscope
- microscope slides and coverslips
- saline solution
- pipettes
- some basic stains and litmus paper

Total cost — less than $500 US dollars.

Macroscopic appearance

Useful information can be gained by careful inspection of the faeces with the naked eye[1]. The history of the patient's diarrhoea should be kept in mind whilst looking at the faeces. The *Clinician's Guide to Aetiology* published in *Diarrhoea Dialogue 7* and the new wall charts now available from the Ross Institute of Tropical Hygiene* may be useful aids in this preliminary screening.

- Profuse watery stools, sometimes flecked with mucus, occur in toxigenic *E. coli* diarrhoea and in cholera (rice water stool).
- Smaller, soft and frequent stools containing blood and mucus occur in amoebic dysentery and in bacillary dysentery due to shigella or campylobacter infections.
- Pale, frothy stools occur in giardiasis, tropical malabsorption and in lactase deficiency in infants.

Acid or alkaline reaction (pH) A simple litmus paper check on the stool pH can be helpful. Acid stools occur in amoebic dysentery and in lactase deficiency. In bacillary dysentery the stool is alkaline.

Microscopic examination

The stool should be as fresh and warm as possible when examined.

Saline preparation Place a drop of saline (0.9% sodium chloride) at room temperature onto a warm slide and, selecting an appropriate section of the faeces, i.e. from an area of bloody mucus or from the liquid part of the sample, use a stick to transfer a *small* amount to the slide. Emulsify this in the saline and place a coverslip over the preparation (discard the stick safely into disinfectant or burn). Examine the sample under the microscope using a 10x eyepiece and, initially, a 10x objective. Close the condenser iris diaphragm sufficiently to give good contrast. Careful searching of the whole coverslip area at this magnification could reveal active larvae of *Strongyloides*, ova of *Schistosoma* or other helminths, or clumps of pus cells and erythrocytes which indicate an inflammatory response to bacteria or amoebae.

Now turn the 40x objective into the viewing position and again search the whole coverslip area.

Dysentery At this level of investigation, the most important distinction that can be made is between amoebic and bacillary dysentery. Both stools may contain pus cells and macrophages and these show up well if a drop of 1% methylene blue stain is run under the coverslip. There may also be erythrocytes (red blood cells) in the stools.

In amoebic dysentery, if the specimen is fresh (still warm), very active trophozoites of *Entamoeba histolytica* (20–40 microns in size, i.e. about twice the size of polymorph leucocytes (pus cells)) ought to be easily observed moving rapidly across the slide, pushing out clear pseudopodia and containing ingested red blood cells. There should be no confusion between amoebae and macrophages which may also contain red blood cells. The amoebae move about and constantly change shape. The macrophages become immobile within a few seconds. In bacillary dysentery, caused by infections such as *Shigella*, *Campylobacter* and possibly invasive *E. coli*, there will be many pus cells, erythrocytes and macrophages, but no active amoebae or cysts. (Occasionally patients may have both amoebic and bacillary dysentery at the same time).

Flagellates Few or no cells in a fatty or unformed sample may indicate the cystic or trophozoite stages of *Giardia lamblia* in the saline preparation. The refractive axostyle and flagellar components of the cysts can be shown more clearly by using an iodine stain (1 in 5 dilution of Lugol's iodine in 10% acetic acid). A thin saline suspension of faeces smeared on a slide, air dried and fixed in methyl alcohol can be stained with a 1 in 20 dilution of Giemsa stain in pH 6.8 buffer for 15 minutes and will demonstrate the morphology of the trophozoites of *Giardia*. Fat is seen as yellow globules or fine needles and can be stained red with 1% alcoholic Sudan 111 stain.

Other flagellates may be present but are not pathogenic.

Vibrio cholerae Dark ground illumination and a hanging drop preparation are needed to identify the darting motility associated with cholera vibrios. A dark field condenser costs about £90 to modify a normal microscope. A temporary version can be contrived using plasticine or putty to use with the 40x objective (see page 61 in volume 1 of Monica Cheesbrough's *Medical Laboratory Manual for Tropical Countries* — reviewed on page seven).

Hanging drop preparation Take slide and make a ring of about 1cm diameter using vaseline. Place a coverslip flat on a table, add one drop of the liquid stool in the centre and place the vaseline ring on the slide over this drop. Quickly invert the slide and inspect under the 40x objective for the typical darting movement by rod-shaped organisms.

Tony Moody, Senior Chief MLSO, Hospital for Tropical Diseases, St Pancras Way, London NW1, U.K.

[1]*Banu et al 1982 Epidemiologic and clinical features of patients infected with shigella who attended a diarrhoeal diseases hospital in Bangladesh. The Journal of Infectious Diseases, Vol. 146 no 2: 177–183.*

**Inquiries to Dr Isabelle de Zoysa, Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine, Keppel St, London WC1, U.K.*

Control strategies

Although many questions remain about the epidemiology of cholera, there is little doubt about the most effective control measures. Dhiman Barua reviews the key strategies.

Cholera control can best be achieved through a national CDD programme that ensures adequate training, proper treatment, community involvement, uninterrupted supplies of ORS, laboratory and other back-up facilities, regular surveillance, and measures to improve water supply, excreta disposal, personal hygiene and food safety. The important strategies for cholera control are described below:—

1. **Early detection of epidemics** through continuous surveillance.
2. **Active case-finding** with the help of community elders, religious leaders and teachers, and through home visits by local health workers reinforced by mobile teams, if necessary.
3. **Provision of early and proper treatment of cases.** This includes the establishment of temporary treatment centres if the permanent facilities are not within easy reach, so infected people travel as little as possible.
4. **Extremely thorough disinfection** of the clothing, utensils, excreta, vomit, and environs of cholera cases (by boiling, or with disinfectants like lysol, cresol or lime, as appropriate). The dead bodies of cholera victims should be disposed of with the minimum of transportation and rites, which can spread the disease.
5. **Health education**, properly carried out, can achieve a great deal, even in the most desperate situations. All health workers should provide health education while providing services. All appropriate media should be used and special attention given to densely populated areas. Simple explanations of *factors* helping the local spread of disease and the ways in which the population can help interrupt transmission will secure community involvement and minimise panic.

Emphasis on personal hygiene (especially hand-washing with soap and water) and on food and water safety is essential. The necessity for eating only cooked food while still hot and drinking only safe water (boiled, treated, or collected from a safe source and stored properly) should be explained. The need to protect all water sources from contamination must be emphasized; infection is acquired not only by drinking water, but also by bathing or washing articles at contaminated sources. The population should also be informed about the dangers of:

- community feasts and gatherings of any kind, particularly funerals, where safe food and water and proper excreta and waste disposal cannot be assured;
- visiting sick relatives and eating/drinking in the homes of cases;
- contaminated foods e.g. fish and especially shellfish collected from suspect waters, vegetables irrigated or freshened with sewage-contaminated water.

6. **Epidemiological investigations** to determine how transmission is occurring should be undertaken by health workers. In most instances, several factors are involved because of the complex socio-cultural customs of intimate mixing and free exchange of foods/drinks etc, but there are instances when a common source/vehicle (like a well, shellfish, vegetables) has been detected by epidemiological investigations, in which case the outbreak can be quickly controlled by specific interventions.
7. **Provision of safe water** is very important, as the boiling of water is not practical in many situations. Numerous simple and innovative methods are available for the supply and treatment of water. Special attention should be paid to the proper protection, storage and use of water in the home.
8. **Proper disposal of excreta** is vital to protect water sources and the environment. In the absence of any facilities, burial of all excreta, specially those of cholera cases, is essential. Refuse disposal by burning, burial, or other methods should be ensured to prevent fly breeding.
9. **Chemoprophylaxis** i.e. the administration of antimicrobials to healthy persons who are suspected of carrying *V. cholerae* and are likely to become sick or spread the infection is theoretically a sound measure. Yet many countries have experienced that mass chemoprophylaxis does not produce the desired results mainly because the infection spreads faster than the time it takes to reach and treat members of the community. Moreover, by inducing drug resistance, it deprives the actual cases of an effective drug for their treatment.

Therefore, chemoprophylaxis only of *close contacts* in the home of a case was recommended. Recent experience has shown, however, that in many areas the custom of intimate mixing of members of the community and of visiting and sharing foods with extended families makes it difficult to identify close contacts; the recommendation thus becomes unpractical. Chemoprophylaxis may still be effective in situations where everybody in the affected community can be treated *quickly* and *simultaneously* e.g. in a refugee camp.

10. **Vaccination** is no longer seen as an effective weapon for cholera control because of its low efficiency in preventing disease and almost total ineffectiveness in preventing the carrier state. Vaccination is still undertaken in some situations, mainly because it is demanded by an uninitiated public. This should be countered by proper health education explaining the limitations of the vaccine and the risks of mass vaccination (e.g. hepatitis).

Dr Dhiman Barua, Programme for the Control of Diarrhoeal Disease (CDD), WHO, Geneva, Switzerland.

For further reading on this subject contact CDD/WHO at the above address.

Successful ORT

Bert Hirschhorn and Ahmed Youssef lists some important points for doctors, nurses and other health practitioners to remember when giving oral rehydration therapy.

- A health worker must *show* the mother how to mix and give the oral rehydration solution. This is equally important in the clinic and at home, to ensure understanding and correct use.
- ORT does not stop diarrhoea; it stops and reverses the dangerous dehydration caused by diarrhoea. In 50 per cent of children under the age of three, treated with ORT, diarrhoea will continue for three to four days or sometimes even longer. This must be explained to mothers. Once children have been properly rehydrated, they should be given about 400-500cc of ORS each day, as well as being fed, to maintain rehydration until the diarrhoea stops.

The child with watery diarrhoea

- A child who has passed just three watery stools will have lost 150-300cc of fluid (water containing essential body salts). This dehydration represents a loss of 1.5 - 3 per cent of body weight in a child weighing 10 kg. Once 2 per cent of weight is lost, the body reacts to conserve water and electrolytes (body salts). The recommended WHO/UNICEF formula for ORS contains 90 mmol/litre of sodium and is the correct treatment for dehydration. If packets of ORS are not available, an equivalent home-made sugar and salt solution should be used. Plain water, or other drinks which contain little salt, are not recommended for dehydrated children, except where salt and sugar are unobtainable. In such extreme circumstances, any drink available should be used to treat a dehydrated child.
- The child will often pass a large watery stool just after ORT has been started. Mothers, and even some health workers, may believe the ORT has increased the diarrhoea. This is not true. What is happening is called the 'gastro-colic' reflex in which anything entering the stomach causes the bowel to expel its contents. ORT does not increase diarrhoea except when too much sugar is used.

The vomiting child

- If a child vomits, stop giving ORS for five to ten minutes. Then give ORS at the rate of one teaspoonful (5cc) a minute. This may seem slow but provides 300 cc per hour and will nearly always prevent further vomiting.
- The amount vomited is usually smaller than the quantity of ORS taken. If the child vomits less than four times an hour, enough ORS is probably being retained. If vomiting persists (more than four times per hour), use a nasogastric tube to give the ORS.

The thirsty child

- A thirsty child is a dehydrated child. Once rehydration is complete, children usually refuse more ORS, unless hungry and not being offered food.
- A child with hypernatraemia (high blood serum sodium content) may drink a large amount very quickly but seldom vomits in spite of this rapid intake. The child's thirst is a good guide to successful ORT.

The child who refuses ORS

This may be because:

- the child is no longer dehydrated and wants food or sleep.
- the child is still dehydrated but tired and needs to be patiently persuaded to drink (see below).
- the child is irritable because of some other cause such as another infection. A nasogastric tube may be the answer but first try to give ORS with a plastic dropper by slipping this between the child's clenched teeth and cheek. The child will usually swallow as a reflex rather than spit out the ORS.

The weak or drowsy child

- The child who is conscious but too weak to drink may need to be rehydrated by nasogastric tube or by intravenous infusion if in shock. It is worth first trying the plastic dropper technique (or a 5cc plastic syringe without the needle) to squirt the ORS into the child's mouth.

The sleeping child

- Seriously dehydrated children sometimes sleep with their eyes partly open so that only the whites show. Sleep during rehydration means one of two things. Either the child is not recovering quickly enough and is becoming unconscious and needs to be woken up and given more ORS; or rehydration is complete and the child is ready for normal sleep.

Abdominal distension

A distended abdomen in children with diarrhoea is caused by:

- giving salt solution without potassium, either orally or intravenously
- giving anti-motility drugs
- giving cow's milk feeds to a child with lactose intolerance
- surgical problem — this is rare.

Newborns

- Most newborns can take spoon feedings. If not, a plastic dropper or plastic syringe without the needle can be used to give ORS. Newborns are often seen to suck at the tip of the dropper.

The child on a nasogastric tube

Use this:

- at night in hospital when both mother and child need sleep.
- in persistent vomiting when the child is not in shock.
- in emergency — for example while setting up an IV in a shocked child or transporting the child to hospital.

When using a nasogastric drip, mark the starting level of the fluid with a piece of adhesive tape. Write the time on this and mark in the same way the correct level for each following hour. This is to check the drip is working at the correct rate.

The child in shock

See above — the weak or drowsy child.

- Give ORS in addition to the IV if the child is conscious, and stop the IV as soon as the child is drinking well.

Feeding the child with diarrhoea

- Breastfeeding should be continued throughout ORT.
- The child with diarrhoea needs extra feeding as soon as rehydration is complete. If bottle fed, give smaller amounts of the normal feed more frequently. There is no advantage to the old method of 'slow reintroduction' of milk and the mother may dilute the feeds for far too long a time. Older children should be given their normal foods but fed more frequently for a few weeks. Yoghurt, orange juice, bananas and coconut water are recommended to bring up the potassium level. (Do not give coconut water *during* rehydration as its potassium content is too high).

Dr N. Hirschhorn, JSI, 210 Lincoln Street, Boston, Ms. 02111, USA.

Storing and maintaining supplies of oral rehydration salts (ORS)

Whether a country is producing ORS locally or using UNICEF sachets, the product must be properly stored so that it remains effective from the time it is delivered to the central store to the moment it is used. Sodium bicarbonate causes decomposition of glucose in oral rehydration salt mixtures. High temperatures and humidity may accelerate this process and manufacturers must consider these factors when preparing and packing ORS.

Storage

● Temperatures in buildings where ORS is stored should not exceed 30°C. Above this temperature the ORS may melt or turn brown. If this happens, it may be very difficult to dissolve and should not be used. If, however, it has only turned yellow, as long as it can be properly dissolved, it is still safe to use and effective.

● Supplies of ORS should not be stored in buildings with galvanized roofs directly exposed to the sun without adequate ventilation. These rooms get very hot.

● Humidity in stores should not exceed 80 per cent. In higher humidity the ORS is likely to cake or turn solid. Increase ventilation and avoid standing water in or near storage rooms.

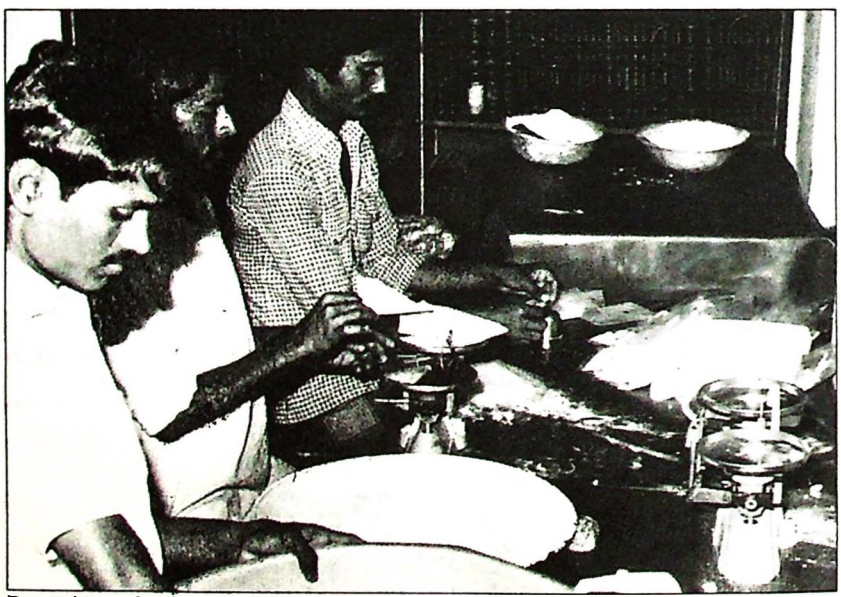
● As far as possible, storage areas should be cleared of insects and rodents.

● Packets should be packed so they are protected from puncturing by sharp objects.

● UNICEF recommend storing their ORS sachets in stacks of cartons approximately 1 to 1½ metres high.

● A rotating system should be introduced so that the oldest ORS (identified by date and batch number) is used first. When in a hurry, avoid distributing the packets which are at the front or the top unless you are sure they are the oldest in the store.

● Regional storage areas should be located in places that will be convenient for subsequent distribution.



Photograph by Asem Ansari

Preparing sachets of ORS in Bangladesh.

Regular inspection of packets

● Laminated foil ORS packets have an estimated shelf life of at least three years. Note the production date on the label. Packets of ORS must be checked regularly (every three months) to see if the quality is still acceptable. Open at least one packet in each batch to see if the ORS is usable. Locally produced packets of ORS are often packaged in plastic and will probably have a shorter shelf life. It is especially important to check them regularly.

● Check ORS packets in any boxes that appear to be damaged. Open at least one packet from the top, middle and bottom of the box to see if the ORS is still usable.

Keeping records at each point where ORS is received and delivered.

● Records should show:
– the quantity, batch number or letter, and date received.
– the quantity and date issued (i.e. sent from one point in the distribution system to another).
– the amount currently in stock.
– stock level at which a new supply should be requested.

● Records should also indicate any problems (such as spoilage due to a leaking warehouse).

● Supplies should be counted every three months and results compared with quantities shown in the records.

● The evaluation of stock is an important factor in determining future quantities of ORS required.

If you are interested in further information on local production of ORS and quality control, the following publications are available from the Programme Manager, CDD Programme, World Health Organization, 1211 Geneva 27, Switzerland.

● *Guidelines for the production of oral rehydration salts.*

● *Good practices for the manufacture and quality control of drugs.*

Medicines with care

Drugs must be purchased, stored and distributed with professional skill. Patients should use them carefully; this often depends on clear instructions. In this article Professor D'Arcy and Dr Harron outline some practical guidelines.

Purchase

- All medicines must be purchased from reliable and well proven sources; if purchased in bulk by Third World health authorities, then advantage should be taken of the WHO certification scheme, through which the quality of medicines is assured.
- If medicines are purchased by the individual patient, then, where possible, professional advice should be sought, preferably from a pharmacist. It can be dangerous to buy medical supplies from non-official or non-professional sources.

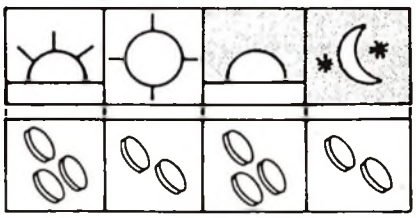
Storage

- Medicines must be stored with care. The basic requirements are the same both for home storage and bulk dispensary storage.
- Medicines:
  - must be kept in a cool and dry place;
  - bulk containers should be stored off the ground so that they cannot be spoiled by rain puddles;
  - should never be allowed to stand in the sun;
  - should be protected in sealed containers, from attack by insects and rats and containers should be properly labelled;
  - must not be used after their expiry date – often this is marked on the label – if not, assume two years from purchase for all solid dosage forms and one year for liquid preparations and creams and ointments. Discard any medicines that show discoloration, fungal growth or any other signs of physical deterioration.
- Some medicines need storage in a refrigerator at a temperature below 5°C; this requirement is usually shown on the container. Do not place any medicines in the freezing compartment of the refrigerator (except for some vaccines which should be stored frozen.)

COSTLY MEDICINES WILL DETERIORATE IF THEY ARE NOT STORED CORRECTLY.

Containers and labelling

- All bulk medicines must be stored in suitable closed containers which are labelled to indicate the nature of the medicine, its source, quantity, dosage and, where applicable, its expiry date.
- Smaller quantities of medicines prepared for individual patient use must be dispensed in a suitable clean and closed container which is labelled with the name of the medicine, the name of the patient, the date of supply, and the instructions for use in a form that can be readily understood by the patient (if necessary pictograms should be used to illustrate the required dosage schedule):



Medicines must not be supplied to patients in a screw of paper or in an open and unwashed container provided by the patient. Every distribution system of medicines should consider the provision of cheap, closable, multipurpose containers as a priority.

Distribution to the patient

- Distribution of medicines should always be in the care of a trained health care worker (preferably supervised by a pharmacist and according to the prescription of a doctor) who dispenses them in a suitable container.
- Labelling of medicines should be reinforced by verbal instructions to the patient or relative. Check to make sure that the instructions have been understood before the medicine is handed over.

COSTLY MEDICINES WILL BE WASTED IF THEY ARE NOT USED CORRECTLY.

Special precautions with medicines for diarrhoea

Oral rehydration salts (ORS) are available through the United Nations Children's Fund (UNICEF) in water-proof foil packets. Both WHO and UNICEF are assisting countries to produce WHO-recommended formulations of ORS; for local production WHO recommends packaging of ORS in polythene where possible. The ORS formulation containing trisodium citrate dihydrate (ORS-citrate) is more stable than the sodium bicarbonate formulation (ORS-bicarbonate) especially in tropical countries where it has to be stored in conditions of high humidity and temperature. Avoid the use of non-WHO recommended formulations of ORS which may be less effective, less stable and more expensive.

Although the use of germ-free water is preferable for mixing the rehydration solution, ORS solution for oral rehydration can be prepared even when pure water is not available. The cleanest safest local water should be used. However, where possible, boil and cool the water before use. To minimise contamination, ORS solution should be made fresh every day, covered and stored in a cool place. Ensure that the volume of water in which the ORS is dissolved is correct. This is vital both in the pharmacy and the home. Check that the patient's relatives understand about the correct volume, and possess a suitable container.

Solutions for intravenous infusion have a role in the treatment of severe dehydration in diarrhoeal diseases. Care is needed as some solutions do not contain appropriate or adequate amounts of electrolytes required to correct the losses from dehydration associated with acute diarrhoea. The needles, tubing, containers (bottles or plastic bags), and fluids used for intravenous therapy must be sterile. Correct storage of these components is therefore crucial and storage conditions must maintain sterility. It is not necessary to store infusion fluids in a refrigerator. The containers should be inspected at regular intervals for damage caused during transport or storage (e.g. leaks, cracks, or splits in containers); all damaged containers should be discarded.

When in use, it is helpful to mark intravenous fluid bottles at various levels with the times at which the fluid should have fallen to those levels. This allows easy and rapid monitoring of the rate of administration of the fluid.

Professor P F D'Arcy, Department of Pharmacy, and Dr D W G Harron, Department of Therapeutics and Pharmacology, The Queen's University of Belfast, Lisburn Road, Belfast BT9 7BL, Northern Ireland.

Using a nasogastric tube

Christine Candy describes the practical issues involved.

Where possible, oral rehydration solution and food should be given by mouth. A nasogastric tube is useful when children are unable to drink safely and in sufficient amounts for any of the following reasons: severe dehydration; if IV therapy is unavailable; low birth weight infants; or the child is drowsy or vomiting. Severely malnourished children may be fed initially in this way if they are too weak or anorexic to eat or drink normally. It is therefore important that health workers know how to use nasogastric tubes.

Equipment

The health worker will need the following:

- Nasogastric tube. A 6 french gauge tube with an internal diameter of 1·4mm, or an 8 french gauge tube with an internal diameter of 1·8mm, is usually suitable. Check that fluid will flow easily down the tube, before passing it down. (If proper nasogastric tubes are not available, polythene/nylon tubes of the right size can be used, provided they are clean, rinsed and have no rough edges.)
- Lubricating fluid such as: 'KY Jelly' or vaseline if available; water; or mothers' saliva, if working in field conditions.
- Syringe (20 ml or 50 ml). This can be used afterwards as a funnel for giving feeds.
- Blue litmus paper, if available.
- Adhesive tape.
- Stethoscope if available.
- Fluid to be given.

Method

- Explain to the child's parents and the child, if old enough to understand, what you are going to do.
- Lie infants flat. Lie unconscious patients on their sides to avoid aspiration (the regurgitation and inhalation of fluid into the lungs). Older children may prefer to sit up.
- Measure the approximate length from the child's nostril to the ear lobe and then to the top of the abdomen (just below the ribs) with the tube, and mark the position. This will be a guide to how far to insert the tube.
- Clean the nostrils to remove mucus. Lubricate the tip of the tube and gently insert into the nostril. Pass the tube down through the nose slowly and smoothly. Stop if the child gags (retches or chokes) and see if the tube is coiled in the mouth. If it is, gently pull out the tube and try again.
- If the child is conscious, give a drink of water. This helps to pass the tube down towards the stomach and reduces discomfort.
- If the child coughs, the tube may be going into the trachea (windpipe) — pull it out gently and try again. NB. A child who is partly or completely unconscious, may not have a cough reflex and the tube could go down the trachea without causing coughing. Always watch for cyanosis (blue lips and tongue) and distressed breathing. These may be the only signs in an unconscious patient that the tube is entering the lungs.
- Continue to pass the tube down until the position marked reaches the nostril. The end of the tube should then be in the stomach. Check once again for choking, restlessness or cyanosis. Fix the rest of the tube with adhesive tape below the nose and to the cheek or side of the forehead.
- To check that the tube is in the stomach, use the syringe to suck up some fluid and test with blue litmus paper. If the colour changes from blue to red the tube is in the stomach. If blue litmus paper is not available, but the fluid sucked up is clear, containing mucus or partially digested food, this also shows that the tube is in the stomach.
- Another test is to inject 20 to 50 ml of air down the tube while listening to the upper abdomen, either with a stethoscope or directly with the ear. A distinct gurgle will be heard as air enters the stomach. (This will not be heard if the tube is in the lung).
- If satisfied the tube is in the correct position, inject 5 to 10 ml of fluid (saline or OR solution, not milk formula) by syringe, and again look for choking or cyanosis.

Rehydration and feeding

Where possible, give a continuous drip of fluid. If this is not possible, give frequent small amounts using the syringe as a funnel. Hold the syringe upright, about 30 cms above the child's head, for a slow and gentle flow. After each feed, close the tube with a stopper or clamp and note amount given. Before each feed (or every four hours in continuous feeding), look into the mouth to make sure the tube has not come out of the stomach into the throat. Suck up a little fluid and check as before.

Children who are able to drink will normally refuse ORS once rehydration is complete and they are no longer thirsty. However, in nasogastric feeding, the normal thirst mechanism is bypassed and it is possible to give too much fluid. It is therefore important to stop giving ORS by nasogastric tube as soon as the child is able to drink normally or is fully rehydrated. Overhydration can be dangerous.

Prolonged nasogastric feeding

If feeding continues for more than 6 hours, do the following:

- Clean the nostrils with warm water every day, especially around the tube. Change the tube to the other nostril every few days. Keep the mouth very clean with a dilute solution of 8 per cent sodium bicarbonate, if available, or citrus fruit juice. This helps to keep the saliva flowing and prevents infections.
- Wet adhesive tape quickly makes skin sore. Take off damp tape with plaster remover or ether. Clean skin with water and dry thoroughly. Change the position of the tape from time to time.

Stopping nasogastric feeding

If feeding has been continuous, start by changing to hourly then two hourly feeds. Then give every other feed by mouth during the day, continuing tube feeds at night. Tube feeds can then be gradually stopped as the amount taken by mouth increases. To remove the tube:

- Remove the adhesive tape.
- Take the tube out gently and smoothly. (Older children may prefer to remove it themselves).
- Offer the child a drink and gently cleanse the nostrils.

After prolonged nasogastric feeding a child may have feeding problems or loss of appetite. Patience and encouragement are needed to establish feeding by mouth again.

Christine Candy, Paediatric Nurse Tutor, Queen Elizabeth School of Nursing, Edgbaston, Birmingham, U.K.

Choosing a hand pump

John Cuthbert reports on recent testing of hand pumps

The choice of pump must take into account the depth of the well and local conditions, particularly with regard to maintenance. Many pumps are installed in areas where they cannot receive the necessary maintenance and therefore stop working after a short time. A suitable pump should be:

- simple to maintain locally
- easy to repair without using expensive, imported spare parts
- constructed so that it is difficult to steal parts of the machinery.

Other important points:

- there should be as few external fittings as possible, as these can easily be knocked out of place
- if the water is corrosive, the materials from which the pump is made should be chosen to minimise the effects
- if the well dries out from time to time, a conventional pump cylinder with leather cups should be avoided
- otherwise conventional brass cylinders with leather piston cups are quite satisfactory
- the pump must be simple to work. A long handle with a relatively small arc of movement and a counter-balance weight is easiest to use.

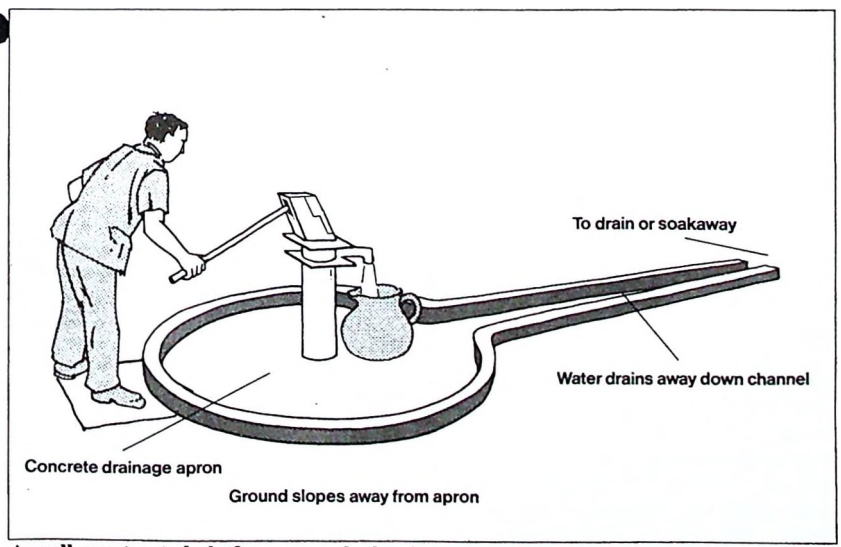
Best buys

The India Mk. II

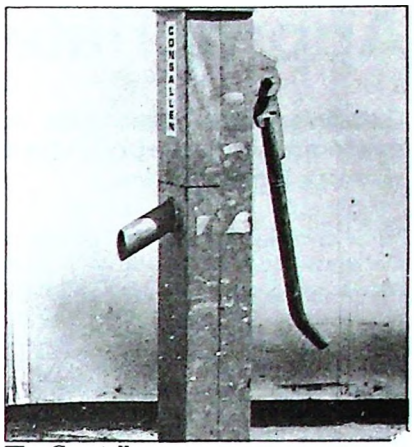
In tests of 12 pumps carried out in the United Kingdom, the *India Mk. II* pump was found to be reliable, required little maintenance, was very easy to use and cheap (£65)*. Its disadvantages are that careful positioning is required in installation and that it can only be used in wells of 20 metres or more since it relies on the weight of the water column to carry the piston downwards.

The Constallen

The *Constallan* pump from England is also good value at £170* and uses stainless steel and plastics in its cylinder for corrosion resistance. It was found to be reliable, although some wear results from pumping waters containing sand. It is not as easy to use as the *India Mk. II*, having a much shorter handle. Installation of the thin and easily damaged cylinder requires care, and maintenance or repairs to the cylinder could be difficult in the field.



A well constructed platform around a hand pump, with proper drainage.



The Constallen.

Alternatives

Verguot Hydropumpe 4C2

Other pumps worth considering include the *Verguot Hydropumpe 4C2* from France at about £350–£400*. This is a foot operated pump which was relatively easy to use, although women wearing saris or long dresses might have some problems. It seems to be reasonably reliable and corrosion resistant. However, it is a complex, novel design. Availability of spares could be a problem and repairs in the field may be difficult. A well organized system would be necessary for maintenance although this should rarely be needed.

The Mono ES 30

The *Mono ES 30*, an English rotary pump at £370*, is very strong and reliable and requires hardly any maintenance. There could be problems in sealing it against contamination of the well, unless a robust well head is available. It is also easy to push rubbish into the spout and down the pump. The samples tested gave a poor performance but the manufacturer claims that the design has now been considerably improved.

It is clear that no one pump is suitable for all countries and all situations. Further evaluation is needed and the World Bank, with United Nations Development Programme (UNDP) funds, is now implementing further extensive tests of such pumps around the world.

* All prices and information correct at time of going to press in 1981.

John Cuthbert is Director of the Water Research Centre, Stevenage, Herts.

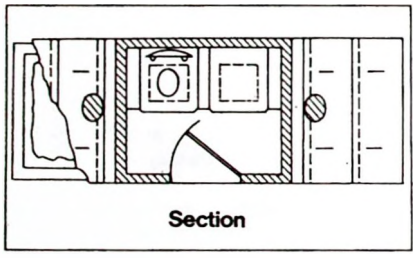
Appropriate latrines

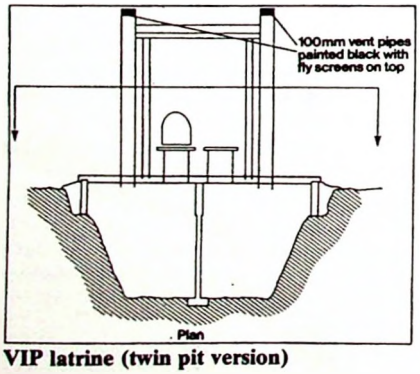
Geoffrey Read describes two types of excreta disposal systems which are both affordable and appropriate for most developing countries.

There are some 2,000 million people in the world today who have no excreta disposal facilities. These will all have low incomes and are unable to afford piped sewerage. *It may also be technically inappropriate for them.* Alternative, well-proven technologies can be used and, if properly designed, they will safely dispose of excreta on site, while being both socially acceptable and affordable to the house-holder. The on-site excreta disposal technologies appropriate for most developing countries are the *Ventilated Improved Pit Latrine (VIP)* and the *Pour Flush Waterseal Latrine (P/F).*

The Ventilated Improved Pit Latrine (VIP)

This latrine comprises a seat or squatting plate (depending on cultural preference) which forms part of a concrete slab over a large pit. The pit is ventilated by a pipe which is covered at the exit by a non-corrodable insect-proof screen. The pipe removes odours and gases and is effective in controlling insects which breed in the pit. Removable concrete covers enable the pit to be emptied when full (pits fill at the rate of between 40 and 60 litres per person per year).





VIP latrine (twin pit version)

Illustrations by Richard Inglis

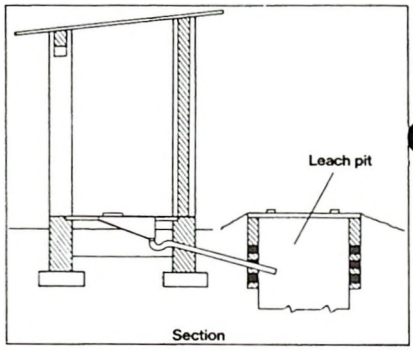
The preferred *VIP* design has twin pits which are used alternately. When one pit is full, it is rested, and the excreted pathogens die away over time leaving a rich humus. During this time, the adjacent second pit is used till full. Two years should be allowed to ensure that the contents of the first pit are pathogen-free. The first pit is then emptied and re-used and the second pit is rested. In this way the latrine remains in one position.

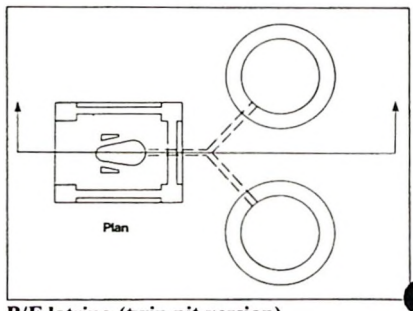
The householder can construct a building over the pit in any available – but preferably permanent – material. The pit cover slabs should not be constructed using wood, bamboo or other materials which will rot. In cases where the water table is high or the ground unstable it will be necessary to line the pit with brickwork or blockwork, ensuring that the lined pit remains porous.

The Pour Flush Waterseal Latrine (P/F)

This model comprises a squatting plate and pan over a water seal, connected by small diameter pipework to an underground leach (filter) pit. The preferred design has twin leach pits, which are used alternately as with the *VIP* latrine. Deposited excreta and urine is flushed away by manually pouring between two and three litres of water into the pan. The waterseal is thereby maintained keeping out odours, gases and insects. The leach pits are generally lined with honeycomb brickwork through which liquids filter away into the ground. The pits fill at about 30 litres per person per year, and are emptied alternately. In heavy clay soil or impermeable rock, the effluent will need to be piped away.

The *P/F* is most appropriate in Hindu and Islamic societies where water is used for anal cleansing. The *VIP* will give excellent service in situations where water is in very short supply. When planning sanitation programmes, existing socio-cultural practices must be carefully considered and the programme tailored accordingly. Provision should also be made for disposing of dirty wash water, either into a separate soakaway or into a piped or covered stormwater drain.





P/F latrine (twin pit version)

Latrines should be located as far away as possible from water supplies; if in doubt get professional advice. Health education, technical support and information programmes are essential components of sanitation development work. In particular, use by all the family must be ensured if the sanitation programme is to be successful.

The provision and effective use of affordable and appropriate excreta disposal systems will bring significant long-term health benefits to the millions of people presently living in unhygienic conditions and continually suffering from gastro-intestinal infections, high infant mortality and low life expectancy.

Geoffrey Read, World Bank/UNDP Technology Advisory Group (TAG).

How to make soap

This article shows how soap can be made cheaply and easily on a small scale, in the home or village, using locally available ingredients.

Soap is a very great help to people in being able to keep themselves and their surroundings clean, and is therefore important in preventing the spread of disease. In some countries soap is unavailable or very expensive. The table below shows the ingredients necessary to make soap.

Basic ingredients

For one bar of soap you will need:

- 230 ml (1 cup) of oil or clean, hard fat.
- 115 ml (½ cup) of water.
- 23.5 gms (5 teaspoons) of caustic soda (sodium hydroxide) crystals or lye.
- Borax and a few drops of perfume are optional.

For 4 kg of soap you will need:

- 3 litres/2.75 kg (13 cups) of oil or clean, hard fat.
- 1.2 litres (5 cups) of water.
- 370 gms of caustic soda (sodium hydroxide) crystals or lye.

- Animal fats such as tallow, mutton fat, lard, chicken fat or vegetable oils such as olive, coconut, palm and palm kernel, cottonseed, castor, maize, soybean, safflowers and groundnut can be used. The best soap is made from a mixture of oil and fat. Even polluted fat can be used as long as it is first melted then strained through a finely woven cloth. Coconut oil makes a softer soap than the other oils (because it is low in stearic acid) and can be greasy. It is however the only soap that will produce a lather in seawater — so in some cases using some coconut oil is good.
- The best water to use for soapmaking is soft water. Rainwater is therefore good. Hard water contains mineral salts which hinder the cleansing action and lathering of the soap. To soften water, add 15 ml or 1 tablespoon of lye to 3.8 litres/1 gallon of hard water and leave to stand for several days after stirring. The water poured off from the top, leaving a sediment behind, is soft water.
- Only caustic soda can make hard soap. The alternative, if caustic soda is not available, is potash or lye, leached from ashes. Caustic soda should be stored in sealed containers to prevent absorption of moisture from the atmosphere.
- Borax, although not necessary, can be used to improve the appearance of the soap and increase the amount of suds produced.
- Perfumes can act as a preservative, but, if used should be resistant to alkali. For 4 kg of soap one of the following should be used: 4 teaspoons of oil of sassafras; 2 teaspoons of oil of wintergreen, citronella or lavender; or 1 teaspoon of oil of cloves or lemon.
- Different proportions of ingredients produce different types of soap: for hard scrubbing soap use tallow for the fat quota; for laundry soap use ½ lard/cooking fat with ½ tallow; for toilet soap use ½ tallow with ½ vegetable oil.

Equipment

To make soap you will need:

- Two large bowls or buckets made from iron, clay, enamel or plastic. Never use aluminium — it is destroyed by lye/caustic soda.
- Measuring cups made from any of the same materials as above, again except for aluminium.
- Wooden or enamel spoons, or smooth sticks for stirring.
- Watertight wooden, plastic, cardboard or waxed containers for a mould; gourds, coconut shells or split bamboo halves can also be used.
- Cloth or waxed paper can be used to line the moulds so that the soap can be easily removed.

Method

- Dissolve caustic soda in water to produce lye water.
- Pour oil into separate container (add borax at this point if desired).
- Pour the lye water slowly onto the oil, stirring continuously in one direction. If an oil-fat combination is being used add the melted and cooled fat to the oil/lye solution.
- Add perfume/colouring now if desired/available.
- When the mixture has a thick consistency, put into lined moulds/cooling frames and leave to set for two days.
- If fat only is being used, it should first be clarified by boiling it up with water and allowing the mixture to cool down and set. The clean fat can then be easily separated and melted again for soapmaking. Always allow the fat to cool down before adding to the lye water, slowly stirring in one direction.

Once the soap is made

- Do not move the moulds.
- When ready, cut the bars into slabs/smaller bars.
- Stack on trays and leave to dry thoroughly for 4-6 weeks.
- When dry, cover to prevent further loss of moisture.
- If the soap is not set after two days, or there is grease visible on top of the soap, leave it to set a little longer.

How to recognise good soap

Good soap should be hard, white, clean-smelling, tasteless and should shave from the bar in a curl. It should not be greasy or taste unpleasant. The main point to remember is that the soap you make does not have to be perfect. As long as it is usable it is better than no soap.

If, however, problems occur, there may be several reasons. Spoiled soap only happens when:

- the wrong materials are used.
- the oil or fat is too rancid or salty.
- the lye water used is too hot or cold.
- the mixture is stirred either too fast or not long enough.

To reclaim soap:

- cut into small pieces and add to five pints of water.
- melt over a low heat.
- boil the mixture until it becomes syrupy.
- pour into a mould and leave for two days before cutting up as before.

WARNING — caustic soda is very dangerous and can burn skin and eyes. Protective gloves should be worn if possible when making soap. If burns occur they should be washed immediately with cold water and then treated with vinegar or citrus juice. Never add water to caustic soda — always add the soda to the water.

For further reading, please write to AHRTAG, 1 London Bridge Street London SE 19SG

Water purification

Most surface water — from rivers, streams and ponds — needs to be purified before it is fit to drink, as it may be contaminated with soil, decayed vegetable matter, and human or animal faeces. Drinking contaminated water is a major cause of diarrhoea. This article briefly describes various ways in which water can be purified. The four most common methods of water purification are:

- storage;
- filtration;
- chemical disinfection;
- boiling.

Storage

Contaminated water can be made safer to drink if it is stored for at least two days. Within that time many harmful organisms will die, and most of the dirt will sink to the bottom of the pot. But this will not kill **all** pathogens and is not effective for very dirty water.

Storage containers can be made of metal, glass, plastic, or glazed ceramic materials. The use of earthenware pots should be avoided if possible, because of the risk of bacterial growth in the porous clay walls. Water can be purified by storage in the home using three pots. Two big pots are used for fetching water on alternate days. The first pot is allowed to stand for two days. Then the clear top water is carefully poured into another (smaller) pot for drinking. The remaining water can be used for washing. When the first pot is empty it is cleaned and refilled, then it is allowed to stand for two days again. Meanwhile the second big pot is used in the same way as the first. In this way each day's drinking water has been standing for at least two days before it is used. Storage containers must be covered to prevent the water from becoming contaminated, to stop algae from growing and to prevent evaporation.

Filtration

A sand filter will remove most of the suspended organic material in water, but it will always let viruses and some bacteria pass through. For this reason, it is best, if possible, to boil or chlorinate water after it has been filtered.

Household sand filter — Using wide, earthenware pots, about 750mm high, 1 litre of water can be filtered every minute. Inside the pot put a thin layer of small stones. Cover this layer with a layer of charcoal, over which put a thick layer of sand. Another layer of gravel can be put on top to stop the sand from being disturbed when water is poured in. The filtered water passes through a tube from the bottom of the filter pot into a collecting vessel. A similar version can be made from three or four clay pots standing on top of each other. The pots, in turn from the top, contain gravel, and charcoal. In the four-pot version the lowest pot is used for storage of the treated water. The filter is simple to make using local materials, and can be kept working well by occasionally removing the top layers and replacing them with fresh gravel and charcoal.

Chemical disinfection

Iodine — Iodine can be used for disinfecting water and is excellent provided the water is not too dirty. WHO recommend two drops of 2 per cent tincture of iodine per litre of water. If the water is thought to be highly polluted then the amount should be doubled — such amounts are not harmful but will give the water a slightly medicinal taste. Iodine compounds, such as tetraglycine potassium tri-iodide are supplied as tablets which are claimed to be effective against amoebic cysts, and some viruses and bacteria.

Chlorine — Chlorine is a good disinfectant for drinking water as it is effective against bacteria associated with waterborne diseases. Bleaching powder contains about 25-30 per cent chlorine. **(WARNING: Keep all kinds of bleach away from children and out of eyes. Do not swallow.)** About 37cc (2½ tablespoons) of bleaching powder dissolved in 0·95 litre (1 quart) of water will give a one per cent chlorine solution. To chlorinate the water, add three drops of one per cent solution to each 0·95 litre (1 quart) of water to be treated (2 tablespoons to 32 imperial gallons), mix thoroughly and allow it to stand for 20 minutes or longer before using the water.

Alternatively, simple chlorinators, which dispense chlorine at a constant rate into a water supply, can be bought or made with local materials. An example is a diffuser chlorinator which is used in non-flowing water supplies like wells, cisterns and tanks. It consists of a pot filled with coarse sand and chlorine powder, submerged in a water supply. The chlorine seeps into the water supply through holes in the container. Diffuser chlorinators have slow rates of disinfection and are most effective in wells or tanks not producing or holding more than 100 litres/day.

Boiling

Boiling is the best way of destroying germs in water. The water must be brought to a good 'rolling' boil (not just simmering) and if possible kept boiling for ten minutes (this may need to be longer at high altitudes). Store the water in the container in which it has been boiled, or, if pouring the water into another container make sure that it is clean. There are certain issues to consider when boiling water to purify it:

- Pathogen survival — some pathogens (E coli and faecal coliforms) and cysts such as giardia lamblia may be killed at lower temperatures than boiling point (about 50 - 64°C rather than 100°C).
- Cost — boiling water for ten minutes or more may be impractical where fuel is expensive or difficult to obtain. Boiling and cooling water also takes time.
- Recontamination — unless boiled water is carefully stored and used, it may be recontaminated by dirty containers, insects, dirty hands etc.

Other methods

Other methods have been used to purify water with differing levels of success. These include using sunlight, alum, ash, clay and traditional materials such as seeds and plants. Some studies have shown that exposing water to sunlight for several hours in a transparent container can reduce the number of enteric pathogens. A recent study in Bangladesh showed that potash alum prevented bacterial growth in ORS solution when used in a concentration of 0·05-0·1 per cent. More research is needed to study traditional and alternative methods of purifying water. The Editors would welcome letters from readers about their own experiences of treating water using traditional methods.

For more detailed information about the methods of water purification described above, please write to Dialogue on Diarrhoea at AHRTAG.

Breast to family diet

Weanlings are particularly vulnerable to infection. Michael Gurney considers how this important time can be made safer and more beneficial for the baby.

Weaning does not refer only to the stopping of breastfeeding. It is the gradual process by which a baby becomes accustomed to semi-liquid and solid foods which increasingly complement breastfeeding. It is complete when the child is eating the regular family diet and breastfeeding has completely or nearly stopped. Phrases such as *"the baby should be weaned at six months"* can be very misleading.

Weaning is one of many changes that all take place together. The weanling child is becoming accustomed not only to new foods but to a new environment and to new physical and mental skills. He is very vulnerable to illness at this time.

When should weaning start?

The best way to wean varies according to the circumstances of each family. If a mother has to go out to work she may have to start giving extra foods earlier than is best for the baby, while continuing to breastfeed whenever she is at home. Where sanitation and cooking facilities are poor, she may be wise to start weaning foods later than is ideal.

In general, breastmilk is perfectly adequate until the baby is at least four to six months old, or weighs about seven kilograms. Other foods need to be introduced about this time to complement breast milk. They are unnecessary, and can be dangerous, if given earlier.

What makes a good weaning diet?

Texture: At first, the baby needs liquid foods. These become thicker until, by his first birthday, he is able to chew pieces of food. A good practice is to start with a porridge or pap containing the food ingredients mixed together into a creamy consistency.

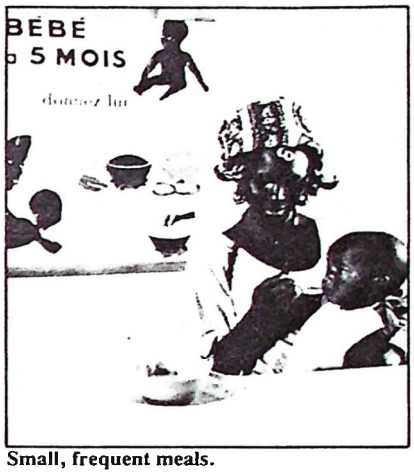
Quantity: Babies have very small stomachs and are growing very fast. They need small amounts of foods which are rich in dietary energy. *Little and often* is the rule. At first weaning food is extra to breastfeeding; as time goes on it becomes the main food, and breastfeeding becomes less important. The frequency of feeding should increase rapidly until the baby is soon taking at least five meals a day plus breastmilk. Feeding should continue at this rate well into the baby's second year. Snacks, such as fruit, between meals are useful — as long as they are always clean.

Quality: Most weaning diets around the world are based on starchy staple foods such as rice, potatoes and cassava. This is fine as long as certain precautions are taken. Such staples are *not* nutritious enough in themselves. A porridge using the staple mixed with something extra is excellent. The best additions are peas and beans mashed with the skins removed; milk; meat (finely chopped) or other *animal foods;* plus dark green leafy vegetables or yellow-orange fruits such as papaya and mango. Suitable recipes and methods of preparing weaning mixes can be found and developed in most cultures.

Energy supplement: Many weaning porridges do not contain enough energy for the baby's needs. During cooking, the starch used in the porridge takes up water and becomes very bulky. Extra oil added to the porridge has two benefits: it adds energy (oil is very rich in calories); and the oil changes the consistency of the porridge, making it easier for the smallest babies to swallow. Oil should be incorporated in all weaning foods except where obesity is a problem.

Two other ways of reducing the bulkiness of weaning foods and making them better and easier for the infant are fermenting or roasting the staple grains. This is done in some parts of the world and can be of great benefit.

Economy: If people spend extra money to buy special weaning foods they are likely to give too little in order to make it last. Weaning foods made at home can be just as good as those bought from shops. In fact, some products sold for babies are very poor in nutritional quality. It is usually best to rely on foods available from the *family pot.*



WHO photo

Small, frequent meals.

Hygiene: Contaminated food is one of the most critical problems during the weaning period. In poor, unsanitary environments it is very difficult to avoid diarrhoea in young children. Breastfeeding provides a major protection against diarrhoea. Good hygiene is essential in preparing weaning foods and keeping them until the next feed. But it is difficult to feed a baby five or more uncontaminated meals a day, when the mother can only afford to light the kitchen fire once. Local technologies need to be used to resolve the problem.

Utensils: Bottles and rubber teats are difficult to keep clean. Moreover, in order for a weaning porridge to pass through the teat it has to be very dilute, therefore the baby risks not getting enough food. *It is best to keep suckling from the breast,* not the bottle. When food is mashed for a baby, avoid using sieves which are difficult to clean. A cup and spoon are suitable for giving weaning foods; this allows the mother to change the food from liquid to semi-solid as the baby grows.

Breastfeeding: Breast milk is very nutritious and protects against infections. It also provides the close, loving contact that encourages secure development. As far as possible, breastfeeding should continue throughout the difficult process of weaning.

Dr Michael Gurney, Nutrition Unit, WHO, CH-1211 Geneva 27, Switzerland.

Feeding the anorexic child

Children with diarrhoea may not want to eat, yet feeding at this time is particularly important. Shanti Ghosh suggests ways to overcome this problem.

A child with diarrhoea may lose his appetite (become anorexic) and, as a result, be difficult to feed. Anorexia can reduce the amount of food consumed by up to 40 per cent. In many cultures, deliberate withholding of food during diarrhoea is very common and further reduces intake. In addition, medical advice often supports withholding of food both during and after diarrhoea, in the belief that food is not absorbed and that the bowel needs to be rested. This leads to rapid worsening of the nutritional status of a child who may already be malnourished.

Breastfeeding

Fortunately, even an anorexic child will usually breastfeed happily. This is because, as well as nourishment, breastfeeding gives comfort and a feeling of closeness to the mother which is particularly important when a child is unwell. Studies have shown that the amount of breastmilk a child takes does not decrease dramatically when a child becomes ill with diarrhoea. Therefore it is important to continue breastfeeding, even after the age of six months when diarrhoea is more common. (After six months breastmilk alone is not enough for the total nutritional needs of the child and additional semi-solid foods should be given.) As far as possible, this additional food should continue to be given to the child with diarrhoea, even though the appetite may be reduced. It has now been shown that the ability of the intestine to absorb nourishment is not greatly diminished in diarrhoea.

Photo by K Indirabai (DD photographic competition)

Breastfeeding gives comfort as well as nourishment to the sick child.

Even the most dedicated mother may find it difficult to feed an anorexic child; she will have to use all her powers of persuasion and ingenuity to make the child eat. Often the child will turn its head away when food is offered, and may not want to eat the usual family food. The anorexic child may find chewing difficult as not enough saliva is produced, so rolls the food around in its mouth and either keeps it there or spits it out. Small quantities of 'soft' foods, which do not need chewing, and which can easily be swallowed, should be offered frequently. There are suitable foods in every culture. For example, porridge, gruel, boiled rice, a mixture of rice and lentils, yoghurt, mashed banana, boiled potatoes or carrots. Fish and eggs can be given where culturally acceptable and available. A mother needs plenty of patience not to get cross with her child, especially if she is tired and busy.

Give the child the food it wants

Some children may want to eat savoury foods, and others may prefer something sweet. Mothers should not be too particular about what the sick child eats, as long as it eats something. Many mothers have their own ideas about which foods are easily digestible and which are not. They may insist that a child takes what they consider to be more suitable, while an anorexic child may have its own preferences. The child may not want to eat bland or tasteless food, instead it may prefer familiar foods that have more flavour or are spicy. What is important is that food is eaten, rather than which food.

TALC Photo

A mother needs plenty of patience when feeding an anorexic child.

The bulkiness of cereal based foods can be a problem, as a large volume may contain little nourishment. This can be even more of a problem for the anorexic child. The bulk can be reduced by roasting the cereal before cooking, or better still, by malting, a process involving germination, drying and then roasting again. Adding some oil or butter will increase the energy density.

During the recovery phase of diarrhoea the appetite increases and the mother should take advantage of this to offer more food to the child. Extra food at this stage is important as it helps a child's growth catch up some of the loss which occurs during the illness.

Dr Shanti Ghosh, A1/18 Panchshila Enclave, New Delhi 110017, India.

The feeding and care of infants and young children, 1985. Ghosh S. Voluntary Health Association of India (VHAI), C-14 Community Centre, Safdarjung Development Area, New Delhi 110016, India. Price:14 rupees.

Vitamin A: preventing blinding malnutrition

There is no real scarcity of vitamin A in many African and Asian countries. Problems arise when fruit and vegetables containing vitamin A cannot be conserved, or when it is not culturally acceptable for or is difficult to get children to eat vegetables.

In many areas where xerophthalmia is prevalent there is an abundance of fruits and vegetables that provide a natural source of vitamin A. These are, however, often not eaten, especially by children, the main group who suffer from blinding malnutrition. Many nutrition education programmes are now focusing specifically on children. School children are an ideal target for learning the importance of fruits and vegetables to family health. There are many ways of preparing green vegetables to make them more acceptable to children — for example, chopped and mixed with lentils and other pulses, minced meat, stews and soups. If children still refuse to eat greens, and the family cannot afford the animal foods containing vitamin A (see table), carrots and coloured fruits are also useful sources. It is important to note that vitamin A cannot be satisfactorily absorbed by the body unless there is sufficient oil or fat in the diet.

Common sources of vitamin A

Ready-made sources	Carotene sources*
Meat	Green and yellow vegetables (especially dark green leaves)
Liver	
Fish	Red palm oil
Milk and dairy produce	Yellow marrow, pumpkin and squash
Eggs	Carrot, mango and papaya

*The body makes vitamin A from carotene in the diet.

Vegetables for sale in an Asian Market.

Conserving vegetables (containing vitamin A) out of season

In areas where fruits and vegetables may not be available all year round, sun drying is a useful way of preserving supplies. Perishable fruits are often lost on the way to markets and can be transported more easily in a dried form.

A simple sun dryer like the one shown in the illustration can dry up to 60 kilos of green vegetables a day in a hot, sunny climate. A most important point is that the vegetables must not be exposed to direct sunlight since this destroys a lot of vitamin A. To avoid this, a simple shade of reeds, stretched hessian or cloth can be supported over the drying tray. This does not interfere with the drying process as the drying is accomplished by sun-heated air rather than by direct sunlight[1].

Dried green vegetables and suitable root and fruit crops will provide concentrated amounts of vitamin A.

What is vitamin A?

Vitamin A is a fat-soluble substance, retinol, found in animal foods and dairy products. Carotene, the naturally occurring substance from which vitamin A is made either by humans or animals, is manufactured by plants, particularly those with dark green leaves or with reddish yellow roots or fruits. Dietary fats, pancreatic enzymes and bile salts are all important for the absorption of both vitamin A and carotene, which are transformed by the lining of the intestine into retinol. Most vitamin A is stored in the liver as retinyl palmitate. Free retinol is highly active but toxic and it is therefore transported in the body in combination with a retinol-binding protein. Retinol is essential for the proper functioning of the photoreceptor cells which detect light striking the retina at the back of the eye Hence the night blindness in early vitamin A deficiency. It is also necessary for the production of healthy new cells to cover the eye and line the different body systems like the gut and respiratory tract. Severe deficiency damages the body's defence against infections.

Line drawing showing some sources of vitamin A.

Reproduced fro 'rimary Child Care: Book I' by Maur.e King et al.

Severe xerophthalmia and keratomalacia only occur when liver stores of vitamin A are extremely reduced.

(1) Appropriate technologies for tackling malnourishment. Jim McDowell CONTACT 45, June 1978.

Further reading: *Xerophthalmia Club Bulletin*. Produced by Mrs A Pirie, Nuffield Laboratory or Ophthalmology, Oxford, U.K.

Carrying out a survey on attitudes to diarrhoea

Mothers' attitudes are critical to the success of ORT programmes. A survey to find out their beliefs should, therefore, be an essential step before developing a programme [1 and 2].

We recently received a study from Haiti offering practical suggestions on gathering information before starting a national oral rehydration therapy programme. The study was begun in late 1981. For a year before then, Haiti had been implementing a hospital based ORT programme [3]. Although attempts had been made to teach mothers about the use of oral rehydration solution for several years, community and home-based approaches to oral rehydration therapy were still new ideas.

The Research Section of the Division of Family Hygiene, Department of Public Health and Population discussed the situation with public health workers and drew up a list of simple questions to ask mothers. The questions were designed to give insight into attitudes to diarrhoea in the community and mothers' beliefs about its cause and cure. The questions included:

- How do you know when your child has diarrhoea?
- What causes it? What other names do people use for diarrhoea?
- Is diarrhoea a disease? Can a child die from it?
- Do you know a child who has died from diarrhoea?
- What do you do when your child gets diarrhoea?
- Should liquids and/or food be given when your child has diarrhoea?
- Why or why not?
- What are good foods/liquids for a child who has diarrhoea?
- Should you continue breastfeeding a child who has diarrhoea?
- Who in your community can help you if your child has diarrhoea? (doctor, health worker, traditional birth attendant, leaf doctor, traditional healer, etc.)
- Is there a particular medicine you give your child when he has diarrhoea? Which one?
- Would you like to learn how to treat diarrhoea with a solution of salt and sugar which you can make in your home?

Photograph by Michael McQuestion

Haitian mothers believe in continued breastfeeding when children have diarrhoea.

Survey in urban areas

These questions were translated into Haitian Creole and posed initially to half a dozen mothers living in or near the capital city. These mothers had already heard of ORT, knew about mixing a home-made solution of sugar and salt, believed strongly in continuing breastfeeding, giving liquids (boiled and carefully handled), and spoke of reducing heavy, fat foods but not eliminating food altogether. The families were also aware of the danger of dehydration from diarrhoea and knew they were dealing with a potentially serious health problem. They generally recommended seeing a doctor and knew specific health facilities where they could get help.

While the first interviews also provided ideas on foods and liquids that are traditionally considered good and bad in treating diarrhoea (diarrhoea is considered to be a "hot" illness in Haiti so "cool" foods must be given), the mothers had obviously already had some exposure to modern ideas.

Rural areas

Consequently, the next interviews were with mothers in more isolated rural areas. A total of 16 interviews lasting between 10–30 minutes were taped. Rather than transcribing all the data, the cassettes were replayed several times and notes taken on the most relevant points. The fieldwork in five different rural areas was done by the Haitian Center for Applied Linguistics, which was gathering data for a linguistic atlas of Haiti and offered to cooperate with the Division of Family Hygiene's Research Section.

The age of the respondents varied between 20 and 70 years. All the women interviewed recognized diarrhoea by the presence of liquid stools in great quantity and most saw it as a life-threatening disease. The majority said that food intake should not be stopped during diarrhoea, and generally had reasonable ideas of the type and quantity of food to provide.

The general consensus was that breastfeeding should continue in order to give the child strength and that

liquids (tea, juice, rice water, cow's milk) should continue as well. Half of the respondents had already heard of ORT.

The causes of diarrhoea mentioned included teething and 'spoiled' mother's milk as well as some modern beliefs related to poor hygiene. Treatment of diarrhoea begins at home but many of the mothers mentioned the need to seek medical assistance.

Results

The main results of this small study were confirmed in a larger nutrition survey of almost 900 mothers which included questions about their views on the nature of diarrhoea, and feeding practices to follow when it occurs. This supported a general feeling that others in rural Haiti are very favourable to the introduction of an ORT programme. There do not appear to be traditional attitudes and beliefs that are obstacles to a national effort to treat diarrhoea. Mothers seem to be quite ready to take action when diarrhoea strikes and are ready to accept an appropriate technology.

In Haiti a complex magico-religious system underlies views of health and illness and what can be done to resolve problems. While a simple study focusing on practical issues in ORT did not need to analyse this system in detail, a sympathetic awareness of the importance of traditional medicine (often all that people in rural areas have to help them in major crises) is very important. The team who carried out the study described here plan further work on this subject.

Study sent by Dr James Allman, Center for Population and Family Health, Columbia University and Dr Maryse B. Pierre-Louis, Division of Family Hygiene, Department of Public Health and Population, Port-au-Prince, Haiti.

(1)Rohde J E 1980 Attitudes and Beliefs About Diarrhoea: The Mother's Role. Diarrhoea Dialogue 2: 4–5

(2) Lozoff B, Kamath K R and Feldman R A 1975 Infection and Disease in South Indian Families: Beliefs About Childhood Diarrhoea. Human Organization Vol 34, No. 4: 353–358

(3)Pape J 1981 Introduction and Promotion of Oral Rehydration Fluids in Haiti. USAID, Port-au-Prince, Haiti.

General points to remember:

Many people dislike or distrust surveys. This is particularly true in poor communities which are frequently studied but rarely see any results. Proper organization of a survey and a sympathetic approach when carrying it out will make it far more likely that the end results will be acted upon.

- Try to find out what problems people feel are most important and see what ideas **they** have for solving them.
- **Only** ask for the **minimum** amount of information necessary for the survey. Make sure that people understand **why** you are collecting the information.
- Talk to enough people to ensure collection of a cross-section of opinion from within the community. The number of people you can reach will obviously depend on the questioners available. If you are training questioners, it is **very** important to spend time on this. An unsympathetic, abrupt approach when asking questions can produce forced answers and ruin a survey.
- Try to ask questions in such a way that people can learn something at the same time as they answer. Avoid asking leading questions and if a person does not understand what to reply, offer several different possibilities including an open response like 'none of these answers'.
- If possible, try to avoid using questionnaires when talking to people (small tape recorders were used in the Haiti study).

However, you will need questionnaires/checklists at some stage to set down the information gathered in a logical way. Apart from the questions listed on page six, the following topics could also be included in a diarrhoea survey:

- What household remedies are available for diarrhoea?
- Does each household have a supply of salt and sugar which could be used for making oral rehydration mixture?
- What containers are available for storing water, mixing up a solution and measuring salt, sugar and water?

Your survey could also include the local shops, pharmacies and the nearest dispensaries and health centres. At these places check:

- Which diarrhoea treatments are used.
- How much stock is kept and the turnover.
- Availability of packets of oral rehydration salts (ORS).
- If alternatives are used what do they cost and what is their chemical composition?

It is also important to examine water sources, storage of water and the use and maintenance of sanitation.

Summary of the important steps in a diarrhoea survey:

- Consider the questions that will provide the necessary information to improve the diarrhoea service.
- Set these out in a questionnaire and test them with and on local people.
- Choose and train questioners.
- Survey a representative number of people in the community.
- Summarize the results and apply them to modify and improve the diarrhoea prevention and treatment services.

Useful further reading:

Barker DJT 1976 Practical Epidemiology. Oxford University Press.

Bennett F J 1979 Community Diagnosis and Health Action. The Macmillan Press Ltd.

Cutting W A M et al 1981 A worldwide survey on the treatment of diarrhoeal disease by oral rehydration in 1979. Annals of Tropical Paediatrics 1:4: 199–208.

McCusker J 1978 Epidemiology in Community Health. African Medical and Research Foundation, Nairobi, Kenya.

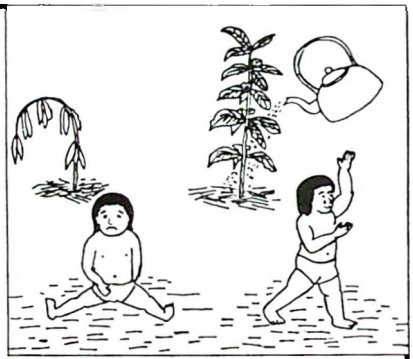
Werner D, Bower B 1982 Helping Health Workers Learn. The Hesperian Foundation, PO Box 1692, Palo Alto, California, USA.

Getting the message across

A health education programme that is to be effective, whether nationally or locally, must use many ways of getting its message across. Posters, puppets, cartoons, simple leaflets and even magic are just some of the methods that can be used to convey basic health messages. Where oral rehydration is concerned, providing sachets of oral rehydration salts or measuring spoons without appropriate instructions may do more harm than good. This page shows three simple ways of telling people about rehydration.

Cartoons

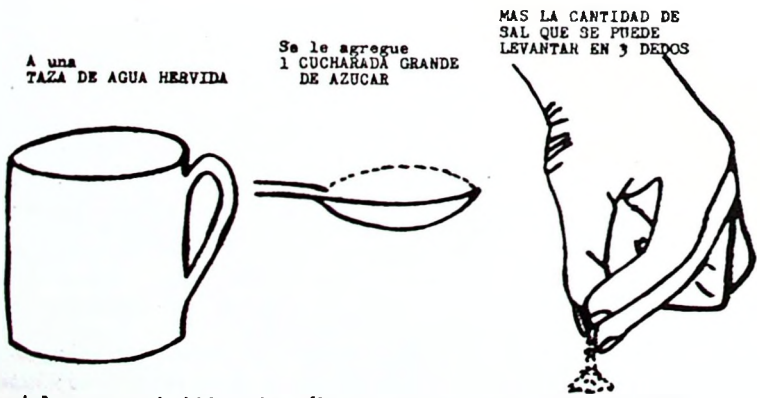
Professor C. Y. Chen of the Faculty of Medicine at the University of Malaya has adapted Jon E. Rohde's story of Abdul and Seri into a local cartoon book. The story shows how older brothers and sisters and grandparents can all help when younger members of the family have to be treated for diarrhoea. The story has also been converted into an audio visual set for use in West Malaysia.



Abdul and Seri.

Local leaflets

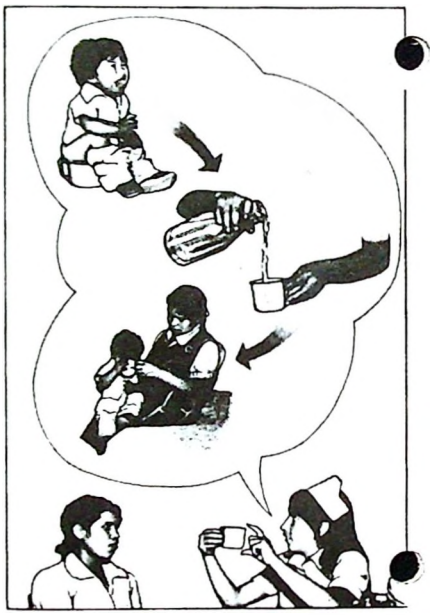
Our illustration showing how to mix oral rehydration solution is taken from a simple course on common diseases produced by the Programa Promotores de Salud in Huehuetenango, Guatemala. The leaflet also contains basic advice on respiratory and stomach infections and a chart for keeping a record of the patient's health.



A la persona deshidratada, dále traguitos en cucharaditas de SUERO PARA TOMAR cada 5 minutos hasta que empiece a orinar normalmente. Una persona grande necesita 3 a 6 litros al día. Un niño chiquito necesita, por lo menos, 6 tazas al día.

PIATA

PIATA-Mexico has developed a leaflet on oral rehydration salts for use in the National Health Programme. The leaflet has been tested in rural areas, especially among illiterate women. It is used by auxiliary health personnel to explain to mothers how to prepare the solution, when to give it and how often to give it. The importance of continuing to breastfeed the child during the treatment is also stressed.



An illustration from the PIATA leaflet which conveys the message about oral rehydration in a simple way.

A copy of the pamphlet is given to the mother with a packet of oral rehydration salts and serves as a reminder of the verbal instructions given by the health worker. The pamphlet does not contain words. A small version of the leaflet is now available, the same size as the packet of oral rehydration salts. If you would like further information on the design, testing or adaptation of these materials, please contact PIATA (Programa para la introducción y adaptación de tecnología anticonceptiva) Shakespeare 27, Mexico 5, D.F., Mexico.

Simple but not easy

Health education materials using only pictures are needed in many countries. The end result may look simple but the development and production process is complex. Margot Zimmerman and Joan Haffey describe PATH's* work in this field.

PATH has been preparing illustrated materials for non-literate audiences for several years. Their first health-related pamphlet, on how to mix and give oral rehydration salts (ORS) solution to a child with diarrhoea, was designed in Mexico.

Other PATH* projects to develop instructional materials and packaging to improve the understanding and acceptability of ORS have been carried out in Bangladesh, Indonesia, the Philippines, and Thailand [1]. A new project was recently begun in Sri Lanka.

Broader lessons

Besides the detailed guidelines above, PATH has also learned some broader lessons. These apply to any efforts to communicate information about health or development.

Continuous field-testing and revision As materials are prepared, continuous field testing and revision with the intended audience are essential to ensure that the materials are understood and serving their purpose.

Multi-level approach When introducing a new product or method, a broad approach to providing information to all those who will come in contact with it is best. Doctors, nurses, fieldworkers etc. all have different information needs, and materials should be appropriate to the services they perform and what they need to do their work more effectively.

Involving the national programme early A pilot project that is developing materials intended for use on a wider scale must involve the final distributor of the materials at a very early stage. PATH has seen from its own experience that failure to do this can prevent even successful materials from ever being used throughout a country. Government staff must feel a part of the project. This also helps to ensure that elements of the message or materials design will be appropriate to *mass* distribution.

Unexpected findings Project staff should realize that this work can lead to unexpected findings. While evaluating the Mexican ORS pamphlet, it was found that, despite the scepticism of both US and Mexican staff conducting the research, both men and women preferred a version of the pamphlet showing active involvement of the father in the care of the sick child to one with only the mother. New projects will teach new lessons to target audiences and staff alike.

National self-sufficiency Pilot projects that develop information materials by using the methodology described here also serve a broader purpose: project staff will be learning skills that build a national expertise in producing other information materials. This can lead to national self-sufficiency in this type of education and communication.

Guidelines for production

From its work in this field PATH has developed guidelines for the production of instructional material for non-literate communities:

- Keep pictures as simple as possible. A crowded scene will divert attention from the message being conveyed.
- Though excessive detail interferes with understanding of the message, comprehension may also be reduced by over-simplication.
- Content must be limited to the most important messages. Only 8-12 major points can be effectively covered in a single pamphlet.
- Each picture and each page should have a single, sharp meaning.
- Visual symbols should be as realistic as possible.
- Pictures are more likely to be successful if faces, clothing and buildings are based on what is familiar locally.
- Use only familiar objects and symbols to portray a message. For example, many different kinds of light sources could be used to signify night (a light bulb, a kerosene lamp, a candle, a metal lamp). The symbol chosen must be tested with people from the intended audience to ensure it is appropriate.
- Material produced for national distribution may not be equally appropriate for all regions of the country.
- The ideal length for a pamphlet is usually 16 pages. This often corresponds both to the space necessary to depict 8-12 major messages and to the attention range of most readers. It is also usually the most economical format for high-speed printing presses.
- Initial print runs should be small, even if the cost per copy is higher, so that changes can be made following further evaluation and before mass distribution.
- Understanding of the picture is greater when a person's whole body, rather than just part of it, is illustrated.
- If the material will be printed in more than one colour or will include simple words, these choices should be pretested in the same way the illustrations are tested. Remember that certain colours have different meanings in different societies.
- Using colour at all also adds to the production cost, an important point to remember.
- Non-literate people do not necessarily look at pictures in the order intended. As messages are being tested, it is useful to ask several groups of people to arrange them into the sequence that seems most logical to them.
- The design and testing of simple materials are more complicated and require much more time than the development of written materials. **Simple does not mean easy.**
- The intended audiences should always have the final say about the content, illustrations, and sequences used.
- Not all kinds of technical information can be transferred through illustrations. Pictures can probably be used to teach someone how to change a motorcycle tyre, but it is doubtful they can be used to teach a person to drive that motorcycle.

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**PATH — the Program for Appropriate Technology in Health.*

[1]Reprints of a paper describing these projects, "ORS: Promotion of Acceptability and of Safe and Effective Use," are available from PATH.

Evaluation of training

Birger Forsberg describes several methods for evaluating the impact of training on the practices of health workers.

Training in programmes for the control of diarrhoeal diseases (CDD) is very much oriented towards changing health workers' performance in supervisory activities and their behaviour in the treatment of diarrhoea. It is becoming increasingly important to evaluate this aspect as countries accelerate their programme activities. Some countries have started to develop methods for evaluating the impact of training on the practices of health workers.

Follow-up

In the United Republic of Tanzania, for example, a series of clinical management workshops was held in 1986. Supervisory visits are now being made to participants, six to 12 months after the training, to assess how they are applying the skills taught at the workshops. As one of the objectives of the training was to teach participants how to organise diarrhoea training sessions, this area is given special attention during the follow-up visits. The trainees are given the opportunity to explain their problems and the assistance they need to successfully promote proper diarrhoea management in their hospitals. This type of follow-up is appropriate when a training programme is focused on a small group of persons who have a major responsibility in the CDD programme. It is not feasible for the evaluation of large-scale training activities.

Nepal provides an example of how extensive programmes can be evaluated. The country is training health workers in a new regionally phased programme. During a CDD programme review in 1986, the practices and skills in the treatment of diarrhoea of a random selection of health workers were assessed (Table 1). Records showed that children treated at health posts in districts where the staff had been trained were significantly more likely to receive ORS than those in 'untrained' districts. There was little difference in the use of antibiotics between the two groups. Written guidelines for diarrhoea treatment were available more than twice as often in facilities with trained personnel.

Table 1. Availability of written guidelines and frequency of treatment of diarrhoea with ORS and antibiotics at health posts, Nepal

	With trained staff		With untrained staff	
	No.	Per cent	No.	Per cent
Health posts surveyed	13	—	13	—
Posts with treatment guidelines	7	54	3	23
Diarrhoea cases in under-fives	219	—	103	—
Cases treated with ORS	156	71	48	47
Cases treated with antibiotics	178	81	96	93

Comparing trained and untrained health workers

Interestingly, interviews with health workers did not reveal any differences between trained and untrained health post workers in knowledge of how to assess and treat diarrhoea, primarily because the untrained health workers were fairly familiar with these skills already. This suggests that the training has been partially successful in changing the practices of the health workers with regard to the use of ORS. Further efforts must now be made during training to discourage the use of antibiotics.

Checking records

Another example can be taken from Sudan. A rural health training programme was evaluated by a review of daily attendance records at different health stations. This involved counting total numbers of visits, diarrhoea and dysentery cases, and cases given antibiotics, ORS, or both. Records were checked before training in ORT, and at intervals of one, six and 18 months after training. The results are shown in Table 2.

The training appears to have had a definite impact on the behaviour of the health workers; ORS was prescribed much more often and antibiotics less often than before the workshops.

Evaluation is an important part of training programmes. These examples illustrate some ways of evaluating the impact of training on the actual performance of health personnel:

- follow-up visits including discussions with trainees;
- interviews, observation and comparison of trained and untrained health workers; and
- checking and comparison of hospital records before and after training.

Health staff in charge of CDD programmes and Diarrhoea Treatment Units (DTUs) could consider including such methods in their training programmes.

Birger Forsberg, MD, Evaluation Officer, CDD Programme, WHO, 1211 Geneva 27, Switzerland.

DD would like to hear from readers about their own experiences with evaluation of training.

Table 2. Diarrhoea and treatment with ORS and sulphonamides, Sudan

	No. of cases	ORS	Sulphonamides
		%	%
Before introduction of ORT	1140	8	76
1 month after training workshops	698	64	45
6 months after training workshops	1981	59	38
18 months after training workshops	4060	72	22

Theme: Dysentery

Technical Literature Update on DIARRHEA

Technical Editor: Robert Northrup, M.D.
Managing Editor: Lisa Dipko

Vol. VII, N°4 1992

DYSENTERY

As control of diarrheal diseases (CDD) programs have begun to examine the impact of their efforts, it has become apparent that dysentery and persistent diarrhea play an important role, in some cases a dominant role, in mortality from diarrhea. The next two issues of the *Technical Literature Update* focus on dysentery, responding to the recent outpouring of articles on that problem in the published literature. Dysentery or bloody diarrhea is more complex in its diagnostic and therapeutic pathways than dehydrating watery diarrhea. It cannot be dealt with by a universal solution like ORT, and it falls prey to a range of issues surrounding the use of antibiotics. The articles and commentaries in this issue touch on the epidemiology of dysentery, as well as community and environmental aspects of its control.

Dysentery is characterized by the frequent passage of loose stools with blood and mucus, and often is accompanied by other symptoms such as fever, severe abdominal cramps, and tenesmus (rectal pain following defecation). Unlike most watery diarrheal diseases, which result from infection in the small intestine, dysentery results from infection in the colon, resulting in inflammation and often in ulceration. Dysentery is often labeled either "bacillary" (caused by bacteria, most commonly *Shigella*) or "amebic." The proportion of dysentery which is bacillary or amebic is variable, but in general, bacillary dysentery is much more common. *Shigella* is not the only cause of bacillary dysentery, but it is the most common. Other bacterial agents that can cause dysentery include invasive *E. coli*, *Campylobacter*, and probably *Aeromonas* and *Plesiomonas*. *Shigella* organisms are divided into four species: *S. dysenteriae*, *S. flexneri*, *S. boydii*, and *S. sonnei*. *S. flexneri* is the most common cause of endemic dysentery in developing countries while *S. dysenteriae* is frequently associated with severe epidemic disease. *S. sonnei* seems to be unusual in developing countries but is the most frequently isolated species in industrialized countries.

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Islam, A.B.M.Q.; Siddique, A.K.; Mazumder, Y.; et al. "A STEEP DECLINE OF DEATH IN A SHIGELLOSIS EPIDEMIC IN BANGLADESH BY A COMMUNITY-PARTICIPATED INTERVENTION." ***Journal of Diarrhoeal Disease Research*****, vol. 6, nos. 3 and 4, September and December 1988, 215-20.** ***Order #3256***

Summary

An epidemic of shigellosis began in Dimla, Bangladesh on March 2, 1985. People of the community raised funds and requested assistance from the local Health Administration and the Epidemic Control Preparedness Programme (ECPP) of the International Centre for Diarrhoeal Disease Research, Bangladesh to operate a local, makeshift hospital. This facility, which functioned in a school building from April 20 until the end of the epidemic on July 14, was able to treat 40 to 50 patients at a time.

A physician assessed each patient twice daily. Clinically diagnosed blood-dysentery patients were rehydrated as necessary. Ampicillin by oral route (100 mg/kg/day) was given to all patients initially. For those patients who did not show clinical improvement within 48 hours, nalidixic acid (55 mg/kg/day) was then given. Patients were fed protein-rich meals three times per day. Patients and attendants were given soap for washing their hands before meals and after defecation, to avoid spreading infection.

Data on patient numbers and deaths were collected from the routine subdistrict diarrhea surveillance records and from treatment charts. It was found that the intervention produced a 187-fold decrease in the case-fatality rate, which dropped from 11.2% (70 deaths among 626 cases) before the hospital was established to 0.06% (one death among 1,708 patients) during its existence.

A sub-group of 108 hospital patients was studied for clinical and epidemiological characteristics. Only 22% of stool cultures (taken from 65 of these patients) were positive for *Shigella*. Although the organisms from 86% of the cultured patients showed resistance to ampicillin, 70% of the 108 patients in the sub-group improved with ampicillin treatment. Common dysenteric symptoms included acute onset of diarrhea, fever, frequent bloody-mucoid stools, and abdominal cramps. Most of the patients had mild to no dehydration and had come to the hospital within 5 days of onset. Conversely, surveillance data showed that 80% of pre-intervention deaths occurred after 5 days of illness.

It can be extrapolated that another 191 patients would have died without the services of the community-operated hospital. Similar interventions may avert almost all deaths in rural epidemics of shigellosis.

Editorial Comment

This report describes a remarkable event, a community responding to a devastating dysentery epidemic by organizing a practical, close, and therefore easily accessible, makeshift treatment center *cum* hospital, and reducing subsequent mortality from the epidemic from 11% to almost zero. The report shows first of all the dramatic damage that dysentery can exert in a community epidemic, enough to energize the community and local doctors to stop everything else and take action. I wondered what role the information obtained by the routine diarrhea surveillance system had in bringing this about. Scattered over a rural area, would the community and responsible physicians have known that an epidemic was taking place, and how damaging it was, without that routine surveillance data? I suspect it was quite important in providing a solid factual basis for motivation toward action.

Second, the report dramatizes for me the fact that a comprehensive approach to dysentery treatment is needed to have such a positive impact. Good diarrhea management, in particular assessment and treatment of dehydration and aggressive feeding, was probably as important as the antibiotic therapy, especially in that two-thirds of the initial deaths were in children under 5, many of whom were undoubtedly undernourished. With fully 6% of the specially studied group severely dehydrated, and another 14% moderately dehydrated, keeping the patients alive with fluids was a necessary first step to allowing the antibiotics to eliminate the organism. The extra attention to feeding may have been particularly

Technical Literature Update

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important in supporting healing of the intestine in what was probably a generally malnourished group of children.

Third, locating the treatment center in the community and providing quick access allowed for early initiation of treatment. The authors comment that prior to opening the community center, the nearest source of care was a rather distant government health center, 10 km from the epidemic. In addition, the treatment there may have been minimal; many rural health centers have shortages of personnel and supplies, and monitoring of patients may be difficult or impossible. The close and well-run community treatment center allowed for earlier and better treatment and patient monitoring.

Was the epidemic in fact shigella, despite the low *Shigella* positivity in the specially studied patients—only 22%? I suspect it was because of the classic pattern of illness and mortality. In developing countries, some 60% of bloody diarrheas are caused by *Shigella*, and it is without question the most likely cause of epidemics of bloody diarrhea such as this one. The authors attribute the low positivity to the long period the specimens spent in transport media before inoculation of culture media.

Was ampicillin the reason for the patients' recovery, despite the fact that 86% of the *Shigella* samples were resistant to it? Here I wonder a bit more. The authors state that patients with mucoid stool only were also counted as "blood-dysentery" patients, despite the name. How many of the patients who recovered with ampicillin alone were in fact infected with *Shigella*? We know that *Shigella* infections do recover spontaneously in most patients. Would many of the patients have done as well without ampicillin?

These questions demonstrate the importance of careful documentation of both clinical and laboratory characteristics of patients and organisms. It is not possible to draw dependable conclusions from this study regarding the effectiveness of ampicillin in cases of *Shigella* dysentery which have been shown to be resistant to ampicillin *in vitro*.

Bennish, M.L.; Wojtyniak, B.J. "MORTALITY DUE TO SHIGELLOSIS: COMMUNITY AND HOSPITAL DATA."
***Reviews of Infectious Diseases*, vol. 13, suppl. 4, 1991, S245-51.**
Order #5040

Summary

Published data on the mortality associated with shigellosis in developing countries are available from three primary sources: investigation of epidemics of dysentery caused by *Shigella dysenteriae* type 1, surveillance of endemic diarrheal disease in communities, and hospital records. Investigations of eight dysentery epidemics in various countries worldwide between 1969 and 1984 showed overall incidence rates ranging from 1.2% to 32.9%; attack rates appeared to have been higher when active case finding was used to detect cases than when passive governmental reporting systems provided the information. Overall case-fatality rates ranged from 0.6% to 7.4%. In general, case-fatality rates during epidemics were highest among infants (17% in one epidemic on an island in Bangladesh) and were higher among both children 1 to 4 years of age and persons over 50 years of age than among other age groups.

Although epidemic *S. dysenteriae* type 1 is the most dramatic manifestation of shigellosis, the majority of *Shigella* infections are due to endemic shigellosis caused by other *Shigella* species. Information about endemic shigellosis is available through the Demographic Surveillance System maintained by the International Centre for Diarrhoeal Disease Research, Bangladesh in the rural district of Matlab. This system has monitored diarrheal deaths in a population of about 200,000 since 1965. From 1975 to 1985, deaths attributed to dysentery accounted for more than 20% of deaths from all causes in the 1- to 4-year age group for every year except 1981. Deaths due to dysentery outnumbered deaths due to watery diarrhea by a ratio ranging from 2.1 to 7.8. Using data from Matlab to estimate nationwide mortality for dysentery and shigellosis, one can calculate that in peak epidemic years such as 1984, dysentery accounts for approximately 150,000 deaths among children aged 1 to 4 years in Bangladesh, of which about 50%, or 75,000, are due to *Shigella* dysentery. In non-epidemic years, an estimated 35,000 such children die from dysentery.

Information from the Dhaka and Matlab diarrhea treatment centers, both of which provide in-patient care, has also been analyzed. Hospital fatality rates for patients admitted to the Dhaka unit with any species of *Shigella* ranged from 13.9% in infants to 3.7% in patients over 15, with an overall mortality of 9.1%. Data from the Matlab field hospital (1983-84) indicated that substantial mortality occurred following discharge. This hospital admits all patients who come for care at least overnight, thus admission does not imply severity or complications. Nevertheless, 4.9% of patients admitted with shigellosis died within 3 months following admission, four-fifths of them after discharge from the hospital. Because of its negative impact on nutritional

status, shigellosis may have a long-term effect on mortality. Three studies from Bangladesh have demonstrated that dysentery has a greater effect on growth than watery diarrhea, and that catch-up growth is less likely to occur after recovery from the infection.

None of these types of data may represent the true picture, for various reasons. The mortality rates from epidemic disease are the most valid; the exact quantitative contribution of endemic shigellosis to mortality is less clear, although certainly substantial. It is evident that prevention of deaths due to shigellosis will require efforts directed at controlling both epidemic and endemic shigellosis.

Editorial Comment

The impressions of *Shigella* dysentery one obtains from these different types of data remind me of the story of the group of blind men trying to understand "elephant." One grabbed the tail and said, "Oh, elephant is like a rope." Another felt the elephant's side, and said, "No, elephant is like a wall"...you know the story. This report shows nicely the "blindness" we experience from different ways of looking at dysentery and *Shigella* infections. Some investigations actively seek cases in the community, and say, "Oh, shigella is widely prevalent, everybody gets it, but only a small proportion die." Others look only at cases which come to health facilities, or more narrowly yet, at cases admitted to hospitals, and say, "No, *Shigella* dysentery affects only a small proportion of the population, but case-fatality rates are high."

Further confounding these contradictory impressions is the influence of varying treatment availability and use. I cannot help but wonder, for example, about the extent to which the availability and use of oral rehydration in Matlab may reduce deaths from watery dehydrating diarrhea and thereby make dysentery a larger proportion of Matlab diarrheal deaths than it is elsewhere in Bangladesh. In the same way, ORT may reduce the proportion of diarrheal deaths overall among all childhood deaths in Matlab. If one chose by chance an elephant to investigate whose trunk had been cut off in a logging accident, would one want to conclude confidently that "elephant" was a short-nosed animal? Looking at relative proportions of dysentery and diarrheal deaths in Matlab may be like that.

The data from hospitalized cases are also exaggerated in certain ways. Hospital admissions are likely to be selected not only for severity of their dysentery, but also for severity of underlying or complicating factors (e.g., fever, pneumonia, malnutrition, shock). Is it appropriate to generalize that *Shigella* dysentery, like measles, has long-lasting effects on mortality (increased mortality during the 3 months after admission) from such a sample of cases? Although hospital policy admits all cases that reach the Matlab hospital, the patients who choose to seek care at hospitals are already a highly self-selected and biased group.

The authors of this review are not guilty of being blind: they carefully describe the limitations of each of the three types of data they present. Yet we the readers, as "blind men," must be even more on guard to avoid the unconscious tendency to conclude "Elephant is like a rope," or "Dysentery occurs mostly in malnourished children," after grabbing only one part of the animal. All of the impressions of "elephant" are true, but each is not the whole truth.

Henry, F.J. "THE EPIDEMIOLOGIC IMPORTANCE OF DYSENTERY IN COMMUNITIES." *Reviews of Infectious Diseases*, vol. 13, suppl. 4, 1991, S238-44. *Order #4845*

Summary

Various community studies in both urban and rural Bangladesh have provided information on the prevalence and incidence of dysentery as well as its association with pathogens, nutritional status, persistent diarrhea, and mortality. In one study, *Shigella* was isolated from 50% of stools with blood, but was also present in 19% of mucoid stools. In a comparative longitudinal study in urban Zinzira and rural Mirzapur, *Shigella* was recovered in 9.4% of urban dysenteric (bloody) stools, and 28.3% of rural dysenteric stools. The peak prevalence of watery diarrhea occurred at 6 to 11 months of age, while the peak prevalence of dysentery occurred at 18 to 23 months. In another study, children averaged one attack of bloody diarrhea per 2-year period; these episodes lasted an average of 14.2 days. Several studies have shown that *Shigella* is the dominant pathogen in cases of dysentery in Bangladesh.

Study results have also shown that cases of dysentery are more likely to persist than cases of watery or mucoid diarrhea, and that the prevalence of dysentery, as well as *Shigella* isolation, is higher in persistent diarrhea patients than in patients with acute watery diarrhea. A Teknaf study showed dysentery lasting a mean of 8.8 days, watery diarrhea 5.4 days. A Matlab study found that 21% of *Shigella* illnesses lasted 10 to 19 days, and 16% continued more than 20 days.

In Teknaf, dysentery lasted significantly longer in children with stunted growth. Similarly, height-for-age was the most significant determinant of the duration of dysentery. Several studies in Bangladesh have suggested that dysentery has a particularly strong negative effect on linear growth. The reasons for this may be the longer duration of dysenteric episodes than watery diarrheal episodes, the greater likelihood of enteropathy with protein loss in the stool (82% in dysentery versus only 38% in watery diarrhea), or the fact that already stunted children have longer dysenteric episodes.

An active surveillance study in Matlab found equal mortality in children under 5 from acute dysentery and acute watery diarrhea—5% of total mortality from each. In another area of Bangladesh, however, child deaths from dysentery were 1.8 times higher than deaths from watery diarrhea. Another report from Matlab showed dysentery accounting for 20 to 50% of all diarrhea-associated deaths; 56% of these dysentery-associated deaths were due to acute bloody diarrhea, and 44% to chronic dysentery. Comparing various causes of diarrheal deaths, the Matlab surveillance study found that acute watery diarrhea, acute dysentery, post-measles dysentery, and persistent diarrhea each accounted for 13% to 15% of diarrhea-related deaths in children under 5. In contrast, persistent diarrhea in association with malnutrition caused 42% of diarrheal deaths.

Dysentery and *Shigella* infection can be prevented by improved hygiene and water/sanitation. Installation of latrines and tube wells reduced the prevalence of bloody and mucoid diarrhea in one study area, but had little effect on watery diarrhea. Other results showed that handwashing with soap and water can also interrupt transmission of *Shigella* infections.

Since the largest single group of diarrheal deaths occurs in malnourished children with persistent diarrhea, most often associated with dysentery, CDD programs which focus only on ORT are unlikely to have a major impact on diarrheal mortality. Other important program components should include improvement of nutrition, weaning practices, personal and domestic hygiene, and sanitation.

Editorial Comment

It is becoming ever more apparent that dysentery, especially in combination with malnutrition, is at least an equal, and in some localities a greater, cause of diarrhea-related death than watery diarrhea. Many of the data in this review are from Matlab, the field research area of the International Centre for Diarrhoeal Disease Research in Bangladesh (ICDDR,B). Knowing the special nature of the facilities there, one may wonder to what extent quantitative results from Matlab are directly transferrable to other sites. I have no doubt, however, that the general conclusions are transferrable, and that dysentery is a major challenge to CDD programs today, even more so as dehydrating watery diarrhea is dealt with by better rehydration treatment.

The review raises an important question facing those who would investigate the epidemiology of diarrhea: What word or words should be used to elicit the presence of diarrhea? Few reports describe in adequate detail the word or words used in asking families if their children have diarrhea or watery diarrhea or just loose bowels or dysentery. Yet, in Bangladesh, the responses to the word "diarrhea" may differ substantially from the responses if the words *amasha* (mucoid diarrhea) and *rokto amasha* (bloody/mucoid diarrhea) are used. How many of the differences reported from study to study are related to the ignorance of the investigator regarding the different words families use to describe their diarrheal illnesses? Perhaps some of the early priority given to watery diarrhea as a cause of morbidity and death may have been due to insensitivity of interviewers to the fact that the word "diarrhea" does not include dysentery in the minds of a particular population. We seem to be seeing an increase in the quantitative importance of dysentery. Was it there all the time, but not detected, because the words used by field interviewers to ask families about diarrhea did not include bloody diarrhea?

The author's conclusion raises the question of the appropriate balance between preventive and curative services in CDD programs. Is the current emphasis on case management likely to result in mortality reduction? In countries such as Bangladesh, where the data suggest that ORT alone will have only a limited effect on mortality, would an educational stress on case management of dysentery have a greater effect? Or are the problems in the health system too great for the system to effectively support good dysentery case management? If families understand the principles of dehydration and oral rehydration, they can prevent death from dehydrating diarrhea at home. Practitioners can similarly use available solutions if ORS packets are not available. But for dysentery, antibiotics are needed to prevent mortality in the severe cases. Can CDD programs overcome the weaknesses in health system logistics and drug management which make antibiotics unavailable in many health facilities?

Cohen, D.; Green, M.; Block, C.; et al. "REDUCTION OF TRANSMISSION OF SHIGELLOSIS BY CONTROL OF HOUSEFLIES (*MUSCA DOMESTICA*)." *The Lancet*, vol. 337, no. 8748, April 27, 1991, 993-97.
Order #4760

Summary

The effect of control of houseflies on the incidence of diarrhea and shigellosis was evaluated in a prospective crossover intervention study at two Israeli military field camps several kilometers apart. On the intervention bases, about 60 baited fly traps were placed around the latrines, the field kitchen, and the mess tents, with bait changed twice weekly. Spraying with pyrethrum as a supplementary measure was also carried out. Counts of flies were made thrice daily by counting the number of flies on a 2.5 meter segment of electric wire in two mess tents on both control and intervention bases. Pooled samples of ten trapped flies were ground up, emulsified, and cultured for *Shigella*. Environmental samples from field latrines were also cultured for *Shigella*. The intervention was carried out for 11 weeks at one camp, with the other serving as a control. After 11 weeks, the intervention was stopped at the first camp, and started at the other, concomitantly with the arrival of new recruits. This was done for two consecutive summers (1988 and 1989).

Results showed that fly counts were 64% lower on the bases exposed to fly-control measures (p=0.024). Clinic visits dropped by 42% (p=0.146) for diarrheal diseases (from 25.2% of soldiers to 14.6%) and by 85% for shigellosis (p=0.015, from 4% of soldiers to 0.06%). Rates of seroconversion also fell by 76% (p=0.024) for antibodies to *Shigella* and by 57%(p=0.006) for antibodies to enterotoxigenic *Escherichia coli*. Cultures of 33 pooled fly samples revealed that 6% contained *Shigella* sp. Cultures from 9% of the samples from latrines at both intervention and non-intervention camps yielded *S. sonnei* or *S. flexneri*, indicating that flies in the area of the latrines had access to human feces containing *Shigella*.

This study supports the contention that houseflies act as mechanical vectors, transmitting *Shigella* and other diarrheal infections. Analogous intervention studies should be carried out in developing countries using a combination of fly-control measures and improved sanitation, particularly the VIP latrine, which is relatively flyproof.

Editorial Comment

I was delighted to see this article, as I had long been convinced of the importance of houseflies as vectors, although fly-control measures have not been demonstrably effective. This carefully done study shows that fly control can effectively reduce both diarrhea (although not statistically significantly) and *Shigella* infections. The authors point out that outbreaks of diarrhea, and even of *Shigella*, during the four periods of study, even when fly control was good, suggested that flies were not the only vectors or transmission mechanism. (The cases could still have been caused by contaminated flies, however, as fly control was never complete.) The clear-cut differences in the development of antibodies to *Shigella*, however, confirm the clinical epidemiological data indicating the substantial role of flies in transmission of diarrheal disease and of fly-control measures in reducing this transmission.

Whether fly control could have a similar impact on pediatric diarrhea and in villages of developing countries is more uncertain. The military camp setting described in this paper represented a situation in which most other modes of shigella transmission were not present. Food and water started out clean, and handwashing behavior was ingrained. Hence, fly transmission from latrine to food represented the major role of transmission. Transmission in developing country settings, or where children are involved, is likely to be much more complex. Under these settings, fly control, while useful, may influence a smaller proportion of all transmission. One unique aspect of the military camp setting, for example, was that food preparation was done in a single area, not scattered over the area as it would be in an ordinary village setting. This geographic concentration of food allowed control measures, also concentrated, to be more effective.

Should developing countries make fly control an important part of their efforts to prevent dysentery, or diarrhea? WHO/CDD recently reviewed this question (Esrey WHO/CDD/91.37) and found that almost all the published studies were inconclusive, that fly control was difficult or impossible in many settings, and that the evidence that changes in fly densities led to related changes in diarrhea was not clear. Esrey concluded that fly control was not a cost-effective measure for CDD programs in developing countries which aim to control diarrheal diseases in young children.

This study shows that fly control can be an effective preventive measure in certain circumstances. Certainly CDD programs should not discourage groups wishing to control flies, but should keep in mind that other efforts to prevent childhood diarrhea, such as handwashing and exclusive breastfeeding, are likely to be more effective for the same expenditure of effort, and certainly should not be displaced by fly-control interventions.

Theme: Dysentery

Technical Literature Update on DIARRHEA

Technical Editor: Robert Northrup, M.D.
Managing Editor: Lisa Dipko

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Ronsmans, C.; Bennish, M.L.; Chakraborty, J.; et al. "CURRENT PRACTICES FOR TREATMENT OF DYSENTERY IN RURAL BANGLADESH." *Reviews of Infectious Diseases*, vol. 13, suppl. 4, 1991, S351-56. *Order #4843*

DYSENTERY

This issue continues last issue's discussion of dysentery, particularly *Shigella* dysentery. The articles presented here deal with the reality of treatment in rural areas by often untrained practitioners, the changing nature of antibiotic therapy as resistance to cheaper antibiotics spreads, the belief structure surrounding bathing and washing as key elements in the hygienic control of *Shigella* transmission, and the microbiology and pathology of *Shigella*. Underlying many of these themes are the issues of practicality and of integration of the science of dysentery into the reality of community concerns.

Summary

Dysentery that is primarily caused by infection with *Shigella* is responsible for the majority of diarrheal deaths in Bangladeshi children. This study compared the type of care received by children under 5 with bloody diarrhea to that received by children under 5 with nonbloody diarrhea, all of whom had been ill less than 14 days. From May to November 1988, information on 960 patients (480 with dysentery and 480 with nonbloody diarrhea) was gathered by community health workers during bi-weekly home visits in the Matlab and Chandpur districts. This information included type and duration of the episode; name, type, and location of health care providers used for the episode; and type of treatment received.

The children with bloody diarrhea were more likely to have received care from a medical practitioner. This likelihood, however, was related to duration of illness rather than to type of episode, as 71% of children with either type of diarrhea who had been ill for more than 3 days received some type of medical care.

Allopathy was the most common type of outside care received for both types of diarrhea. Patients with bloody diarrhea were more likely to have been treated by an allopath than those with nonbloody diarrhea (62% vs. 43%). Most of these allopathic practitioners had little or no formal training; only 6% were medical school graduates. Patients also received care from homeopaths (48% of children with bloody diarrhea and 40% of children with nonbloody diarrhea), herbalists (30% and 19%), and spiritualists (4% and 5%). No outside care was obtained in 32% and 42% of cases respectively. In Matlab, community workers recommended that all children with bloody diarrhea (240) be taken to the official treatment centers for treatment, but only ten actually went.

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About a quarter (27%) of all patients with diarrhea in Matlab received oral rehydration therapy, in all cases ORS. In Chandpur only 15% received ORT, all but one as homemade oral rehydration solution. Overall, more children with nonbloody diarrhea received ORT than did those with bloody diarrhea. In most cases, the amount of solution was insufficient to prevent dehydration if the purging rates had been high. Although the low level of use is disappointing in view of the extensive CDD program operating in Matlab for over 10 years, it may indicate a perception that certain children are at lower risk. In fact, none of the children with nonbloody diarrhea became dehydrated.

Allopathic drugs were prescribed for 40% of the children with bloody diarrhea and 22% of the nonbloody diarrhea patients. Overall, 66% of children received a prescription for one allopathic drug while 23% received prescriptions for two, and 11% received prescriptions for three or more drugs. Furazolidone, trimethoprim-sulfamethoxazole, metronidazole, and ampicillin were most frequently prescribed. The latter two drugs were given more frequently to patients with bloody diarrhea than to those with nonbloody diarrhea. Most prescriptions were for an inappropriately small quantity of drug and most of the prescribed drugs were not indicated.

Editorial Comment

Rural Bangladesh appears to resemble India in its care-seeking response to diarrhea and in the actions taken by rural practitioners (see *TLU*, Volume V, Number 7). Rural families prefer to go to the non-physician practitioners who are located close to their homes. Despite the known high quality of care provided at the ICDDR,B centers in Matlab, only a few families used them for bloody diarrhea. As the duration of an episode lengthened, however, families began to seek allopathic care: the use of allopathic treatment went from only 45% of children after 3 days of bloody diarrhea, to 80% after 14 days. About a quarter of all patients sought help from more than one practitioner.

The report unfortunately does not indicate what percent of practitioners prescribed both a drug and ORS for bloody diarrhea or nonbloody diarrhea. We do know that less than 20% of bloody diarrhea patients received ORT, while 40% received drugs. In comparison, nonbloody diarrhea patients received more ORT and fewer drugs.

Given the fact that almost all rural practitioners make their money from selling drugs, not from charging for consultation, I actually was surprised that only 34% of the drug-receiving patients had received two or more drugs—two-thirds received only a single drug. Unfortunately, most of the drugs prescribed were not indicated, and were given in ineffectively small quantities.

The authors comment that given the inevitably high use of these local, easily accessible practitioners, CDD programs must either make an effort to assist these practitioners to give more effective treatment, or give up having an impact on the case management of diarrhea, either bloody or watery. Note how few families accepted the recommendations of the community workers to go to the official health facility for treatment. The authors suggest giving private practitioners a simple treatment algorithm. Such assistance must take into account, however, the economic realities these practitioners face; they must obtain their income from the sales of what they prescribe. Could a way be found, for example, to allow such rural practitioners to make a satisfactory profit from selling ORS packets, or a special diarrhea or dysentery food, or other truly appropriate therapy? Without an approach which responds to the practitioners' survival needs, it may be difficult to convince them to adopt a different treatment algorithm than the one they are now using.

I was also struck by the authors' comment that despite the low use of ORT in nonbloody diarrhea, and the inadequate quantity of fluid given when it was used, none of the patients became dehydrated. Most of our CDD programs recommend giving ORT to every child with diarrhea, from the first loose stool. Mothers appeared to decide that this advice was not sensible, or was more work than was indicated by the child's condition, and did not follow it. We know that a small percentage of children will become dehydrated, even though this report did not find them. What information could be given to these mothers that would allow them to more reliably identify those times, those episodes, when dehydration is more likely to occur, or has already occurred, so that they will be sure to use ORT then?

Technical Literature Update

The *TLU* is produced by the PRITECH Project under Contract #DPE-5969-Z-00-7064-00, Project #936-5969 with the Office of Health, Bureau for Research and Development, of the United States Agency for International Development (A.I.D.). The summaries and editorial comments represent the opinions of the *TLU* editorial staff and are not meant to represent A.I.D. policies or opinions. Inclusion of an article in the *TLU* does not denote endorsement or validation of the article cited, but rather indicates that it is worthy of attention and further critical appraisal.

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Putting more emphasis on dehydration in messages, stressing the observation and estimation of fluid losses, conveying the signs of dehydration so mothers won't miss it, or will pick it up early (e.g., irritability or restlessness as an early sign of "some" dehydration) all have been tried elsewhere. Which set of messages would this population be best able to receive? Studies trying such approaches certainly qualify as essential national (and international) health research.

Salam, M.A.; Bennish, M.L. "ANTIMICROBIAL THERAPY FOR SHIGELLOSIS." ***Reviews of Infectious Diseases*****, vol. 13, suppl. 4, 1991, S332-41.**
Order #5031

Summary

In addition to rehydration therapy and nutritional support, early initiation of effective antimicrobial therapy is an important part of the strategy for reducing mortality related to shigellosis. Clinical trials have shown that use of antimicrobials shortens the duration of symptoms and the excretion of pathogens. For a drug to be useful in treating shigellosis in children in developing countries, it should be inexpensive, safe for use in children, available in an oral formulation, effective *in vitro* against the majority of *Shigella* isolates in the area where the drug will be used, and proven efficacious in controlled clinical trials.

Tetracycline and the sulfonamides alone are no longer useful in treating shigellosis because the majority of *Shigella* isolates are now resistant to these agents. For the last 15 years, ampicillin and trimethoprim-sulfamethoxazole have been the drugs of choice to treat this disease. They are inexpensive and widely available in developing countries. However, in the last 5 years, strains of *S. flexneri*, *S. dysenteriae* type 1, and *S. sonnei* that are resistant to both drugs have been identified in Asia, Africa, and North America.

Nalidixic acid has been the most common alternative for treatment of resistant cases of shigellosis, but resistance to this drug is also increasing. Two other alternative treatment options are the newer quinolines and amdinocillin. Unfortunately, at this time, all three of these alternatives have drawbacks (cost or questions about safety in children). A possible future option that should be explored is the use of second- and third-generation cephalosporins.

Editorial Comment

Does treatment with an appropriate antibiotic lead to a reduction in mortality? The studies used in this excellent review do not answer this critical question directly, but reduction in morbidity with antibiotic use is so obvious that this alone justifies treatment. Indeed the use of a placebo cannot be justified currently in experimental studies. Therefore, it seems very likely that antibiotic use must lead to a reduction in mortality, even if the studies themselves do not prove it. Yet in the real world of community practitioners described in the previous article (Ronsmans et al), there are many factors which interfere with theoretical efficacy becoming real efficacy, including availability of the right antibiotic in the rural periphery, its cost as a barrier to use, the duration of the prescribed course of drugs, the duration of the course purchased by the parents and then actually given to and consumed by the child, etc, etc. So it is not clear at all whether making correct advice regarding sensitivity and the correct antibiotic available to a particular population will lead to a reduction in mortality from shigellosis.

It must be noted that the article reviews studies on shigellosis, not dysentery. We know that *Shigella* causes 60% or so of bloody diarrheas in developing countries, thus it makes sense to manage dysentery as if it were *Shigella* dysentery, since it is impossible in places like rural Bangladesh to identify the specific causative agent. This article speaks of "proven or suspected shigellosis." The results of a particular antibiotic in treating dysentery will vary, however, if the agents causing the other 40% of dysenteries vary in their sensitivity to that antibiotic.

An effective antibiotic for shigellosis is not always easy to predict. Clearly, it should be one to which the bacteria is sensitive *in vitro*. However, not all such "sensitive" antibiotics are clinically effective, and the clinical effectiveness can only be determined through clinical trials.

An important characteristic of real world efficacy may be the ability of an antibiotic to be effective in a short course of therapy, since the majority of practitioners prescribe such short courses. Cost is also critical, especially for newer agents that are very expensive. We face a big problem in the future with resistance now widespread to the current, inexpensive, oral agents such as ampicillin and trimethoprim-sulfamethoxazole, and with manufacturers maintaining high prices for the newer agents. Parenteral agents might be considered, but they have no advantage and are not desirable in developing countries because of the inconvenience, cost and, more recently, risk of AIDS through injections with contaminated needles.

A critical factor in achieving reduction of mortality through treatment is the integration of diarrhea

management with the identification and management of malnutrition. This is especially important in dysentery management, because of the profound impact of dysentery on growth. Building steps to detect the stunted or wasted child into the approach used will be critical in order to ensure closer attention, recommend a return visit, and spend enough time convincing the mother that she must feed the child aggressively and talking with her about how to overcome anorexia. In situations where it is procedurally feasible, doing cultures and sensitivities on severely malnourished children with dysentery would help to ensure that the antibiotic chosen was likely to be effective.

The authors note that antibiotic treatment of watery diarrhea caused by *Shigella* has not proven to be effective. Using standard treatment recommendations, patients with acute watery diarrhea would not be considered for antibiotics initially, so this exception to antibiotic efficacy in shigellosis would not become a problem under field conditions.

Zeitlyn, S.; Islam, F. "THE USE OF SOAP AND WATER IN TWO BANGLADESHI COMMUNITIES: IMPLICATIONS FOR THE TRANSMISSION OF DIARRHEA." *Review of Infectious Diseases*, vol. 13, suppl. 4, 1991, S259-64.
Order #4815

Summary

The pattern of fecal-oral transmission of microorganisms plays an important role in the transmission of *Shigella*. Regular handwashing with soap and water has been shown to reduce such transmission. However, before handwashing can be effectively promoted on a wide scale, it is necessary to understand the perceptions of cleanliness and the roles of soap and handwashing at the community level. This study examined these perceptions among 100 mothers of children under 5 in a rural village and an urban slum in Bangladesh.

Both Bangladeshi Hindus and Muslims view water as an important agent of purification. Although water's religious significance differs between these groups, both regard the simple act of pouring water over the body or immersing the body in water as one of purification. Water is also attributed with a capacity for cooling, important in the system of ideas which classifies many substances according to inherent "hot" or "cold" properties. According to this belief system, a healthy body must maintain a balance between heat and cold, and illnesses may be caused by an extreme.

In these two study communities, after defecation, water from a small pot is used to wash the anal region with the left hand. The hands are then cleaned using ash, mud, or water. The left hand does not touch the right one during this process. Cleaning a child after defecation is generally done by the mother. Although most people regard feces as pollutants, they do not associate fecal contamination with the transmission of agents that cause diarrhea. Muslims are also supposed to wash the right hand and rinse the plate before meals, keeping the left and right hands separated during meals to maintain purity. However, people tend to use both hands out of necessity when preparing food and collecting drinking water, and children often do not make the appropriate distinction between their left and right hands.

Muslims perform ritual bathing before prayer five times a day, as well as at other times. Both Muslims and Hindus also take a daily bath if possible. This is considered a cooling and cleansing act. Most people who use soap buy the type produced for washing clothes since it is cheaper and lasts longer. Body soap is associated with luxury and beauty, a concept reinforced by advertising. Because of this perception, soap is rarely used for handwashing. In addition, because of their cooling properties, both soap and water are perceived as having potentially deleterious effects, especially for children.

To change handwashing habits so that effective cleaning occurs after defecation and before meals, perceptions and practices must be altered. Possible approaches include changing soap advertising so that it stresses the use of soap in handwashing and its benefits for children, and educating people about the relationship between fecal contamination and diarrhea.

Editorial Comment

This article is one more in the battery of evidence showing how valuable, even essential, anthropology and the information gathered by anthropologists is in designing communication messages that will work. If a Western-thinking person develops an advertisement, poster, or community talk based on the idea that people see feces as a source or cause of diarrhea, and are washing to prevent diarrhea, they will probably develop materials which won't work well because of the very different assumptions and beliefs which surround washing, bathing, and soap in other cultures. Only by directly addressing such beliefs in the messages will one be able to convince the listener that the ad understands and proceeds from his or her world view, and therefore must be taken seriously.

Anthropologists can also help to gather the subtle details of current behaviors, needed in order to identify why global or general messages may not work. In this article, for example, we learn that people from this culture generally do not rub their hands together when they wash them, for fear that the left, or fecal, hand may contaminate the right one. It will take a special message to address this detail, and encourage people to rub hands together so as to actually get better cleansing of pollution from the feces.

Put more broadly yet, this article should reinforce our conviction that communications messages and campaigns cannot be designed by men from the Ministry sitting around a table in the capital of the country.

Echeverria, P.; Sethabutr, O.; Pitarangsi, C. "MICROBIOLOGY AND DIAGNOSIS OF INFECTIONS WITH *SHIGELLA* AND ENTEROINVASIVE *ESCHERICHIA COLI*." *Reviews of Infectious Diseases*, vol. 13, suppl. 4, 1991, S220-25. *Order #5042*

Summary

"The etiology of dysentery in Thailand and the existing methods of diagnosing infections with *Shigella* and enteroinvasive *Escherichia coli* (EIEC) are reviewed. The four *Shigella* species (*S. dysenteriae*, *S. flexneri*, *S. boydii*, and *S. sonnei*) are classically identified by culture of fecal specimens on selective media and testing of isolates for agglutination in species-specific antisera. DNA probes have been used to identify both lactose-fermenting and non-lactose-fermenting EIEC as well as *Shigella* isolates that do not agglutinate in antisera. These DNA probes are not necessary for the identification of *Shigella* if a competent bacteriology laboratory with shigella antisera is available. In Thailand *Shigella* and EIEC are isolated more often from children > 2 years of age than from younger children. The clinical illness associated with EIEC infections is similar to shigellosis. Fewer children with EIEC infections than with shigellosis, however, have occult blood in stool (36% vs. 82%) and more than 10 fecal leukocytes per high-power field (36% vs. 67%). Standard bacteriologic methods and testing of *E. coli* isolates for hybridization with the shigella/EIEC probe are currently the most sensitive means of diagnosing infections caused by these enteric pathogens. A more rapid method of identifying *Shigella* and EIEC infections in a situation where a bacteriology laboratory is not available will probably involve immunologic assays." [Published Abstract]

Editorial Comment

How important is it for the practitioner to know what organism is causing the diarrhea, or the dysentery? The protocols for treating diarrhea are based on a progressive increase in detailed knowledge of the nature of the illness. We start with the simple presence of diarrhea, note that diarrhea by definition means fluid loss, and recommend use of ORT in all cases of diarrhea. We increase in complexity from there: presence of blood with the diarrhea means dysentery. Dysentery has a different time course, it won't respond to ORT alone, the patient may have more severe nutritional problems, etc. Knowing that it is dysentery will change both our treatment and our expectations, or prognosis. The problem is that various organisms may cause dysentery, and there is no single medicine, like ORT, which will act against all of them. So we seek more information.

In developing country settings, knowing that the disease is dysentery, i.e., that there is blood in the stool, is a fairly good predictor that the cause is *Shigella* (50% to 60% of the time), and therefore treatment with drugs that usually work against *Shigella* is indicated. That doesn't work in a different epidemiologic and environmental setting, such as a developed country, because *Shigella* is not as prominent as **the cause** of dysentery. It also won't "work," that is, won't lead to effective treatment, if the *Shigella* strains prevalent in an area are not sensitive to the usual antibiotics.

The practitioner takes a practical way out: the therapeutic test. Treat the patient with an approach that can be expected to work, use a combination of treatments to cover various less likely possibilities, and see what happens. If the patient gets better, then the "diagnosis" (in fact, the treatment used, whatever the real diagnosis) was correct. If not, then try something else. This approach is practical, but patients and practitioners still want to know the cause. At the heart of the process is a fundamental human need—to name the devil. In general we humans feel much better if we can name the enemy we are struggling with, **even if so naming the devil does not affect our response.**

This article explores the complexities of naming the devils that cause diarrhea, particularly dysentery. Certainly there are other benefits from knowing the organism, the species, even the strain, of the organisms which are causing an individual case, or are the predominant endemic strain, or are causing an epidemic. For research purposes, it may be the central focus of attention. But for therapeutic purposes it is possible to initiate sensible treatment without knowing

the specific causative agent. It must be kept in mind also that identifying an etiologic organism by ELISA or DNA probe still will not definitively predict whether it will respond to a particular antibiotic. Because of this, the therapeutic trial remains an important part of the practical response to dysentery in the individual patient.

The article points out that use of a microscope to detect fecal leukocytes, combined with the knowledge that there is blood in the stool, can be used to predict *Shigella* as the cause of illness. Microscopes are important in developing country health facilities for a variety of purposes, and have a low recurrent cost. This gives microscopes advantages over facilities and supplies for bacteriologic culture, which require refrigeration, become dried out or contaminated after a period of time, and require much more training to use effectively. Only bacteriologic facilities can run the antibiotic sensitivity tests which will predict the effectiveness of various antibiotics against a particular patient's organism however. Work is going on to develop simplified methods of doing ELISA type tests and other rapid procedures in field settings. These development efforts are of equal or greater importance in comparison to the more basic work, such as that reviewed in this article, to develop new approaches to identification and characterization of etiologic organisms.

I point out these various considerations to emphasize that the purpose of identifying organisms must be clear. Is it to determine treatment of an individual patient? If so, simple clinical information plus, perhaps, the examination of a stool for leukocytes, combined with previous knowledge of antibiotic resistance patterns in the locality, may be sufficient to prescribe treatment which will be effective most of the time. Going beyond this in accuracy of identification may require much more cost than the benefit in treatment effectiveness would justify.

Mathan, M.M.; Mathan, V.I. "MORPHOLOGY OF RECTAL MUCOSA OF PATIENTS WITH SHIGELLOSIS." ***Reviews of Infectious Diseases*****, vol. 13, suppl. 4, 1991, S314-18.**
Order #5034

Summary

Biopsy specimens of rectal mucosa from 46 consecutive patients with dysentery, from whom *Shigella* was isolated, were examined. Thirteen of the patients had *Shigella dysenteriae* type 1 (the Shiga bacillus). Microscopic examination of the 46 specimens showed inflammation of the epithelium, with infiltration by polymorphonuclear leukocytes; damage to and detachment of the epithelial cells leading to ulceration; and exudates of inflammatory cells into the lumen of the rectum. Electron microscopy showed actual invasion of the epithelium by *Shigella*, migration of bacteria through cell walls, and damage of organelles within cells, such as destruction of mitochondriae in crypt cells. In the crypts, there was depletion of mucus and increased mitotic activity, presumably to replace epithelial cells being lost at a more rapid rate.

In deeper layers (the lamina propria), examination revealed congestion, edema, and scattered hemorrhages, with an overall increase in cellularity consisting of both polymorphonuclear leukocytes and plasma cells. There also were changes to the blood vessels suggestive of damage by Gram-negative bacterial endotoxin.

In patients with symptoms for greater than 1 week, the investigators found more eosinophils, degranulation of eosinophils and mast cells, an increase in plasma cell activity, and activated lymphocytes, suggesting that cell-mediated cytolysis may contribute to persistence of symptoms of shigellosis. The only difference between patients from whom the Shiga bacillus was isolated and patients from whom other *Shigella* species were isolated was a higher prevalence of epithelial cell detachment and exudate into the lumen of the rectum.

Editorial Comment

These findings are certainly consistent with the large numbers of white blood cells, along with red blood cells, in the stools of patients with *Shigella* dysentery. For me the most interesting finding was the evidence by electron microscopy of activated lymphocytes causing destruction to neighboring cells, presumably activated by immune mechanisms and possibly related to prior sensitization from previous infections. Is it possible that the frequent colonization of the intestine in contaminated tropical environments may augment or extend the symptoms of dysentery when it occurs, through this immune mechanism? Are cells being destroyed as "innocent bystanders" in a process similar to that seen in some autoimmune diseases?

The evidence of active cell reproduction and replacement, with immature cells migrating up from the crypts, suggests how malnutrition may prolong the course of illness by slowing cell reproduction, thereby delaying healing and return to normal functioning of the epithelial cells (and therefore, digestion and absorption). The toxic effects of the bacteria on cells described in this report places a major challenge on the crypts as sources of new epithelial cells which, without an adequate supply of nutrients as building blocks, they will meet only poorly. In light of this, the prolonged impact of dysentery on mortality, even after recovery from acute symptoms, is understandable.

Theme: Health Communications

Technical Literature Update on DIARRHEA

Guest Editor: William A. Smith, Ed.D.
Technical Editor: Robert Northrup, M.D.
Managing Editor: Eileen Hanlon

Vol. VII, N°6 1992

Fox, K.F.A. "SOCIAL MARKETING OF ORAL REHYDRATION THERAPY AND CONTRACEPTIVES IN EGYPT." ***Studies in Family Planning*****, vol. 19, no. 2, March/April 1988, 95-108.**
Order #2541

Summary

In 1983, the National Control of Diarrheal Diseases (NCDD) project, part of the Egyptian Ministry of Health, began a social marketing campaign for ORS. First, the NCDD hired a local consulting firm to conduct marketing research. Data were collected on the public's exposure to the media and on mothers' attitudes and practices about diarrhea. The firm also pretested logos, ORS packaging, media messages, and promotional materials. After initial analysis, the NCDD decided not to segment the public into different audiences: all children could receive ORS, and all family members could be caregivers of sick children. Health workers, however, were targeted separately to receive diarrhea case-management training.

Social marketing is a set of strategies — product, price, availability, and promotion — to convince the public to adopt a product or behavior. In the case of the NCDD's campaign, the product was a locally produced brand of ORS, eventually made in only one size. The affordable price was set by the government, but free ORS was available through health facilities. ORS was made widely available commercially, through wholesalers and retailers, as well as through health services. Finally, a media campaign showing the symptoms of diarrheal dehydration and how to mix ORS was developed and disseminated through radio, television, and print materials.

Guest Editor: William A. Smith, Ed.D.

William A. Smith is Executive Vice President of the Academy for Educational Development, a nonprofit organization with extensive experience in development communication and social marketing. Dr. Smith received his Ed.D from the University of Massachusetts, where he focused on rural consciousness-raising. During his subsequent career, he moved from consciousness-raising into social advertising and finally into social marketing and development communications. He has recently written on behavior change and sexually transmitted diseases, and on social marketing and narcotics education, adding to his earlier work on oral rehydration therapy and immunization programs.

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The campaign was enormously successful. During one year, the percentage of mothers who could recognize dehydration rose from 32% to 90%; and the percentage of mothers who had ever used ORS rose from 1% to 50%.

Meanwhile, the Family of the Future, a family-planning nonprofit organization, began their social marketing campaign for contraception. This campaign was not as successful as the ORS campaign. Contraception is more difficult to market, as it involves advertising several products at once, without being able to explain visually their use, as well as involving culturally sensitive issues. While ORS was quickly accepted and adopted, rates of contraceptive use have been slower to rise.

The need for ORS and family planning will not diminish in the near future. Two other factors point to the sustainability of social marketing in Egypt. First, Egyptian nationals are now well trained in social marketing, and their skills may now be used for other products. This progress does not mean that ORS marketing will decrease, as the use of social marketing for the promotion of other related issues can be used to improve diarrheal disease control. For example, campaigns aimed toward physicians about inappropriate drug use during diarrhea, and messages aimed at the public about infant feeding and hygiene practices can use social marketing strategies, while continuing to promote messages from the earlier ORS campaign. Second, while U.S. aid will not always be available, and Egyptian public funds are limited, social marketing can become self-funding. The commercial firm that produces ORS has already begun to funnel some of its profits back into the NCDD.

Editorial Comment

This is one of the landmark ORS studies of the world. The Egyptian experience is an almost textbook field application of social marketing to ORS. While many lessons emerged from this program, perhaps one of the most important is the interaction of various programming decisions, such as the type of ORS to promote, where to make it available, and what to say about it. Each question was answered through field research on mothers and answers were integrated into a single comprehensive program. This project deserves our continued attention and should be a focus of regular follow-up.

The comparison of ORS with family planning messages in this paper highlights an important but often overlooked aspect of successful behavior change — it matters what behavior you are trying to change. The health education field badly needs a classification system of behaviors and the corresponding optimal intervention strategies. Such a system would help program managers not only select better interventions, but establish more realistic goals for their programs, based on our best understanding of behavioral change.

Briger, W. "MASS MEDIA AND HEALTH COMMUNICATION IN RURAL NIGERIA." ***Health Policy and Planning*****, vol.5, no. 1, 1990, 77-81.**
Order #3695

Summary

This study examined the media habits of adult men and women living in two villages in Oyo state, Nigeria. Survey questions focused on the availability and use of four mass-media channels: radio, television, newspapers, and magazines. Open-ended questions sought information on the recall of health messages, the types of programs preferred, and sources of information on AIDs, yellow fever, ORT, and immunizations.

One town, Eruwa, had a population of 45,000 and had electricity, piped water, a hospital and health centers, a factory, and access to national newspapers and magazines. The second town, Idere, was an agricultural town of 10,000 residents and did not have access to electricity or piped water. Both towns were in range of the national and state radio and television stations.

Technical Literature Update

The *TLU* is produced by the PRITECH Project under Contract #DPE-5969-Z-00-7064-00, Project #936-5969 with the Office of Health, Bureau for Research and Development, of the United States Agency for International Development (A.I.D.). The summaries and editorial comments represent the opinions of the *TLU* editorial staff and are not meant to represent A.I.D. policies or opinions. Inclusion of an article in the *TLU* does not denote endorsement or validation of the article cited, but rather indicates that it is worthy of attention and further critical appraisal.

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Editorial Comment

It is impossible for this editor to be objective about this particular document, given my many years of involvement with the project. It does appear to be one of the few comprehensive attempts, over time and across many cultures, to assess the role of modern communication in the promotion of ORS. Given that fact alone, it represents an almost unique resource to program managers trying to understand how and when to use communication strategies for child survival. The program was also blessed with a unique partnership with the U.S. Agency for International Development (A.I.D.), which provided (competitively awarded) funding over a 14-year period. Several top university research contractors provided the objective evaluation data cited in this publication.

Yet even this comprehensive program leaves many important questions unanswered. Several of the studies were truncated due to political or natural disasters. Other studies suffered changes in design that interfered with the clarity of the research results. But this document presents in a readable and persuasive manner the major lessons emerging from an important, and probably landmark, program that continues today under A.I.D. guidance.

PRITECH announces the publication of two new reports:

- *The Ciclope Innovations in Rural Communication: Reaching the Unreachable Villages in Mexico* — describes a health education intervention in Mexican rural markets. Order #6011.
- *Integrating Diarrhea Control Training into Nursing School Curricula in the Sahel* — outlines the steps taken to develop nursing-school modules. Order #6012.

TLU Survey Results

In April 1992, we conducted a survey to determine how readers use the *TLU* and with whom they share it. Eight percent (or 822) of those contacted by mail returned the survey. Many readers asked for more information about health education. We hope that this issue is useful to you in your work. Here are other results from the survey:

- 46% of respondents reported that reading the *TLU* has changed the way they teach by keeping them updated with the latest scientific information. Many reported using the *TLU* as a reference for preparation of lectures and as reading material for students.

- 43% of respondents stated that the *TLU* has changed the way they manage diarrheal disease cases. Respondents reported that their use of drugs and IV therapy had decreased, while their commitment to ORS and promotion of feeding during diarrhea had increased. Some readers indicated that the *TLU* had helped them prepare for the cholera epidemic in South America.

- 43% of respondents stated that the *TLU* is their primary source of information about diarrheal diseases. In addition, 84% of respondents share their copy of the *TLU* with others, 32% with more than five people. Because of your interest, the *TLU* mailing list has grown to more than 12,500 readers around the world.

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Technical Literature Update on DIARRHEA

Technical Editor: Robert Northrup, M.D.
Managing Editor: Karen White, M.L.S.

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Oladepo, O.; Oyejide, C.O.; and Oke, E.A. "TRAINING FIELD WORKERS TO OBSERVE HYGIENE-RELATED BEHAVIOR." *World Health Forum*, vol. 12, 1991, 472-475.
Order #5825

The process by which investigators selected and trained a group of field workers to observe accurately behaviors related to the prevention of diarrhea is described. The trainees selected were women, thereby meeting local cultural requirements, and all spoke the local language. Some were experienced in field studies and from Ibadan, others were from the villages. Training took place in three phases:

(1) Lectures and discussions on behavior, expected roles of observers working in a village setting, and diarrhea, particularly the different terms used for diarrhea and its symptoms. Graduated practice in observing was given, from general observing to eventually observing hygiene-related behavior in an outpatient department without asking structured questions.

(2) Role-playing with trainees acting as family and as the visitor observer, followed by field training in a poor urban community, with trainees working in pairs for two weeks observing the behavior of women and children in homes. Observations of each were compared until they achieved 90% agreement.

(3) Data collection using draft structured questionnaires involving both questions and observations related to food preparation, feeding episodes, defecation episodes, and child behavior. Discussions examined each variable until there was agreement on an operational definition. The questionnaires were tried in homes, with investigators and field supervisor being present, and comparing notes afterwards. Again, trainees worked in pairs with separate recording until they achieved 95% agreement. The supervisor spent two extra days with trainees whose performance was comparatively poorer.

The subsequent performance and data recording of the trainees in the actual study were regularly monitored and found to be consistent with their training. Mothers rated the trainees' communication as satisfactory.

Editorial Comment

It has become clear to all those working in CDD that detailed information on actual behaviors potentially related to diarrhea incidence is needed if effective messages regarding prevention of diarrhea are to be designed and delivered. The 1987 study of Clemens and Stanton[1] showed the necessity of targeting communication efforts to the specific behaviors responsible for diarrhea in a particular setting. This exquisite report provides an ideal description of the kind of detailed training needed by field workers who

[1] J. Clemens and B. Stanton, "An Educational Intervention for Altering Water-Sanitation Behaviors to Reduce Childhood Diarrhea in Urban Bangladesh: I. Applications of the Case-control Method for Development of an Intervention," *American Journal of Epidemiology*, vol. 125, no. 2, 1987, 284-291; B. Stanton and J. Clemens, "An Educational Intervention for Altering Water-Sanitation Behaviors to Reduce Childhood Diarrhea in Urban Bangladesh: II. A Randomized Trial to Assess the Impact of the Intervention on Hygienic Behaviors and Rates of Diarrhea," *American Journal of Epidemiology*, vol. 125, no. 2, 1987, pp. 292-300.

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are going to be collecting this kind of data. While it seems long and complex, program managers must keep in mind that the effectiveness of their communication campaigns depends on the quality and appropriateness of the messages which it delivers. These will be only as good as the data on which they are based, which in turn depends on the quality of the observers collecting it.

Islam, D.; Tzipori, S.; Islam, M.; and Lindberg, A.A. "RAPID ISOLATION AND DETECTION OF SHIGELLA IN FAECES BY O-ANTIGEN SPECIFIC MONOCLONAL ANTIBODY COATED IMMUNOMAGNETIC BEADS." In: Adram, D.S.; Hasan, H.; Agboatwalla, M.; Jalaluddin; and Tahir, Ali S, eds. *Reflections on Diarrhoeal Diseases and Nutrition of Children: Proceedings of the Sixth Asian Conference on Diarrhoeal Diseases,* December 11-13, 1992, 46-53.

A method for detecting the presence of Shigella in diarrheal stool using immunomagnetic particles coated with monoclonal antibodies (IMS) was compared with latex agglutination (LA), indirect immunofluorescence (IFS), and routine microbiological culture. The IMSA assay detected 100% of the samples which were positive in culture. It showed positive results later in the clinical course of diarrhea in some samples which were negative on culture because of treatment. LA showed false negatives in 28% of culture-positive samples. IFS was 95% sensitive for detection of Shigella flexneri, and 100% sensitive for Shigella dysenteriae type 1.

Ramamurthy, T.; Bhattacharya, S.K.; Uesaka, Y.; et al. "EVALUATION OF THE BEAD ENZYME-LINKED IMMUNOSORBENT ASSAY FOR DETECTION OF CHOLERA TOXIN DIRECTLY FROM STOOL SPECIMENS." *Journal of Clinical Microbiology*, vol. 30, no. 7, 1992, 1783-1786.

A bead ELISA was evaluated for direct detection of cholera toxin (CT) from stool specimens of patients with acute secretory diarrhea. Culture detected Vibrio cholerae in 59 of 75 stool specimens. The bead ELISA was positive in 50 of the 59 (85%) culture-positive specimens, and an additional 3 specimens negative for culture.

Editorial Comment

These two papers describe promising techniques to detect important pathogens in diarrhea patients rapidly and with a high degree of sensitivity—100% in the Shigella test, 85% in the cholera procedure. Both these agents are of importance in epidemics of diarrhea, and the diseases they cause (dysentery and cholera) should be treated with antibiotics. It is these reasons that justify, at least partly, the use of a procedure to confirm the microbiologic etiology of a clinical diagnosis. Routine management of individual cases in poorly equipped facilities can proceed well on the basis of "diagnosis-by-epidemiology" alone: there is no need to confirm the microbiologic cause.

Public health workers seeking to manage an epidemic of diarrhea in a community, however, often need to identify its microbiologic cause, and could benefit from use of procedures of this type. In the past, cholera could be identified rapidly using a dark-field microscope on a stool specimen, often following brief incubation in enrichment broth to increase the numbers of bacteria. Today, procedures of the types reported here may be more feasible. Once the reagents are prepared, the ELISA procedure reported here is very easy to perform, and may be more feasible than obtaining an expensive microscope. We should reiterate, however, that the care of routine diarrhea patients does not require a microbiologic diagnosis, and therefore would not require the use of tests of the sort reported here.

Excler, J.L.; Standaert, B.; Ngendandumwe, E.; Piot, P. "MALNUTRITION ET INFECTION A HIV CHEZ L'ENFANT EN MILIEU HOSPITALIER AU BURUNDI." *Pédiatrie*, vol. 42, 1987, 715-8.
Order #1716

Summary

This study followed 40 children, aged 2 to 29 months, hospitalized for malnutrition in Burundi to determine the role of HIV in childhood malnutrition, and to describe the clinical differences between malnourished HIV positive

Technical Literature Update

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children and malnourished children who are HIV seronegative. Anthropometric measurements and HIV tests were taken, and treatment included a fortified, high protein-energy diet plus any medications needed.

Eighteen of the 40 children (45%) were HIV positive, but all five infants under six months of age in this study were HIV positive. Vertical transmission accounted for 15 (83%) of the 18 cases; blood transfusions accounted for three (17%).

The malnutrition cases seen in the HIV positive group were more often complicated by other problems. Protein-energy malnutrition started at an earlier age in this group. And other symptoms characteristic of HIV infection were also seen, such as thrush, labored breathing, skin lesions, and swelling of lymph nodes and the liver. But no difference was seen between seropositive and seronegative children concerning fever or diarrhea. Finally, HIV positive children did not respond as well to the improved diet given as therapy: seven HIV positive children did not gain weight.

Editorial Comment

This report gives a foretaste of what lies ahead in countries in which AIDS is added to an already difficult situation for children. While the sample selection of this study is biased (admissions to hospital for malnutrition, not a community population), the disproportionately large percentage of HIV+ children (45%, as compared to the proportion of HIV seropositive women in prenatal clinics of only 11%-28%) suggests that HIV infection is rapidly debilitating.

This is borne out by the earlier onset of malnutrition in these children, suggested by the large number of infants under 6 months who were HIV seropositive (5) compared to no seronegative malnourished infants under 6 months who required hospital admission. Given the likely high prevalence of breastfeeding in this population, it may be that breastfeeding during this first 6 months of life was not effective in protecting these infants from malnutrition, due to the detrimental effects of their HIV infections, although the authors unfortunately did not report information about breastfeeding.

We see also that many of these HIV-infected children responded poorly to the high protein-energy feedings provided by the hospital, in contrast to the seronegative children. Possible reasons would include inadequate intake of the feedings, inadequate absorption of nutrients due to morphologic abnormality or intestinal malfunction, or a higher rate of energy consumption or metabolism due to their ongoing opportunistic infections. Indeed the authors suggest that in this environment, failure of a malnourished child to respond to an appropriate therapeutic feeding regimen suggests the presence of HIV infection, especially when accompanied by other evidence suggesting HIV infection such as hepatomegaly, adenopathies, and skin and mouth lesions.

As with diarrhea, the poor response of these children to therapy will doubtless discourage both parents and practitioners from making an intensive effort to help them. This may lead to children not infected by HIV failing to get treatment for malnutrition due to the premature assumption of HIV infection.

Keusch, G.T.; Thea, D.M.; Kamenga, M. et al.
"PERSISTENT DIARRHEA ASSOCIATED WITH AIDS."
***Acta Paediatrica*, supplement, vol. 381, 1992, 45-8.**
Order #6271

Summary

Preliminary analysis was carried out of an ongoing prospective longitudinal study of 469 babies born to HIV seropositive and seronegative mothers in Kinshasa, Zaire. The objective of the analysis was to determine the incidence of diarrhea and the proportion of cases in which diarrhea persisted for more than 14 days. During the first 6 months of observation 269 episodes of acute diarrhea were observed. The mean duration of diarrhea was 5 days. Sixteen (5%) of the 269 acute episodes of diarrhea became persistent. The persistent diarrhea rate in HIV+ infants was over 6 times that of infants born to HIV seronegative mothers, and three of the four babies who died with persistent diarrhea were HIV+. The persistent diarrhea rate in HIV- infants born to HIV+ mothers was intermediate: 3.6 times the risk of HIV- babies.

Surprisingly, no association of persistent diarrhea was seen with breastfeeding before or during the diarrhea, water source, preparation of formula, use of boiled water, antecedent malaria or measles, or use of antibiotics. Fifty percent of the deaths in the babies were due to acute or persistent diarrhea, and were strongly associated with HIV infection. The article also reviewed other aspects of overall morbidity and mortality and of diarrhea disease relative to HIV status, based on reports from other centers.

Editorial Comment

This report, unlike most of the literature on diarrhea related to HIV/AIDS, focuses on children, the population with the highest non-AIDS diarrhea rates and the emphasis of control of diarrheal disease (CDD) programs. We note a relatively low incidence of diarrhea overall—0.6

episodes per infant in 6 months or 1.2 episodes per year, compared to general figures of 2.5 to 3.5 episodes per year in under-fives overall. This low incidence may be due to high rates of breastfeeding in this population, although this preliminary analysis does not report an analysis of overall diarrhea incidence relative to breastfeeding.

Yet the persistent diarrhea rate in the HIV+ infants was high: six times that in the HIV- infants from HIV- mothers. Seeing this, we might immediately jump to the conclusion that the persistent diarrhea results from immunosuppression, but it may well relate to other factors in some of the infant-mother pairs, as the persistent diarrhea rate is higher also in HIV- infants who have HIV+ mothers. Those infants may also be immunosuppressed, but perhaps from measles or malnutrition, not from AIDS. Also, as the authors note, HIV+ mothers, some of whom doubtless are suffering from AIDS infections, may be less able to care for their infants because of their illnesses, or because of living situations associated with HIV infection (for example, prostitution, poverty, or husband not at home).

The number of cases upon which these comparisons are based is quite small, only 16 cases of persistent diarrhea overall, due to the limited six-month period of data collection so far in this prospective study. We will look forward to a fuller analysis in the future, when more data become available. In the meantime, this important study draws our attention to the fact that AIDS will add to the diarrhea problem in children both directly, by means of infection and immunosuppression in HIV+ children, and indirectly, by its effect on parents, the home environment, and parental responsiveness to their children.

Dunn, D.T.; Newell, M.L.; Ades, A.E.; Peckham, C.S. "RISK OF HUMAN IMMUNODEFICIENCY VIRUS TYPE 1 TRANSMISSION THROUGH BREASTFEEDING." ***The Lancet*****, vol. 340, September 5, 1992, 585-8.**
Order #6034

Summary

This article estimates the rate of HIV infection of infants through breastfeeding based on four published studies that met the following criteria designed to ensure that transmission took place after delivery: (1) mothers were infected with HIV through a blood transfusion after delivery, or (2) repeated serological testing of mothers shown to be seronegative at the time of delivery and subsequently becoming seropositive. Children in one study (Kigali) born to mothers who seroconverted too rapidly after delivery (within 3 months) were excluded from the analysis.

Combining the data from these four reports shows that the risk of an infant contracting HIV infection from breastfeeding alone is 29% (95% confidence interval 16-42%).

The additional risk of transmission through breastfeeding, when breastfeeding follows exposure of the fetus to a seropositive mother in utero during pregnancy and subsequently during the delivery process, was estimated by comparing breastfed infants with exclusively bottlefed infants born to mothers known to be HIV positive. Six studies provided the data for this summary analysis. The additional risk of breastfeeding in such cases was 14% (95% confidence interval 7-22%), with extremes from the six studies being from a high of 33% (Australia) to a 5% lower risk of HIV in breastfed infants (Miami), compared to bottle-feeding infants.

Editorial Comment

Since we last discussed this issue in the TLU (vol. V, no. 4), a number of careful studies have been published, and much discussion of policy has taken place. This careful metaanalysis of two sets of studies summarizes what we know at present. It confirms that breastfeeding by a HIV+ mother puts the child at substantial risk of becoming infected with HIV: 29% in mothers seronegative at birth, 14% in mothers seropositive at birth.

Why should the second rate be lower? The authors point out the possibility that IgG antibody may be transmitted to the infant via the placenta during pregnancy and protect the child from infection by viruses transmitted during the traumatic birth process, also that mothers with antibody may be less likely to have viremia than mothers who are newly infected and have a period of intense viremia during breastfeeding prior to their own antibody response to the virus.

What should CDD programs recommend regarding breastfeeding? The most difficult aspect of this is the fact that most infected mothers in developing countries do not know that they are infected, and few developing countries would be able to do HIV serology on all pregnant women. In such circumstances recent computer modeling of risks indicate that, in most developing countries, breastfeeding is still the safer alternative, as alternatives to breastfeeding (milk, formula) are not safe in a contaminated non-hygienic environment. Discouraging breastfeeding in such circumstances would, according to these calculations, increase mortality, despite the risk of HIV infection and certain death from it. This would be true unless HIV prevalence in women is high, and infant mortality rates are low, a situation which does not currently exist in developing populations.

30 MAY 1989

TECHNICAL LITERATURE UPDATE

A MONTHLY REPORT OF CURRENT LITERATURE ON DIARRHEAL DISEASES & RELATED HEALTH ISSUES

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Molla, A.M.; Molla, A.; Rohde, J. et al. "TURNING OFF THE DIARRHEA: THE ROLE OF FOOD AND ORS." J. Ped. Gastroent. Nutr, 1989, vol. 8, 81-84.

Summary

"Ninety-three boys aged 5 years or less who had diarrhea due to *Vibrio cholerae* were randomly assigned to treatment with glucose oral rehydration salt (ORS) or rice-based ORS. For the first 24 h[ours], ORS only was given to all the patients. During the next 24 h[ours], ORS and normal food were given. The efficacy of the two types of ORS was compared in terms of ORS intake, stool output, change in hematocrit reading, serum specific gravity, and increase in body weight. At the end of the first 24 h[ours] of treatment, a 50% reduction in ORS intake and stool output was observed in the 47 patients randomly assigned to receive rice ORS as compared with the 46 patients who received glucose ORS. During the second 24 h[ours] of treatment, a significant reduction in the stool output was noticed in the glocuse ORS group, making the efficacy of glucose ORS equal to that of rice ORS. The study suggests that normal food can impart some of the superiority of 'super' ORS to standard glucose ORS with regard to reduction of stool volume." [Journal abstract]

Editorial Comment

The exciting core of this report is, FOOD IS AN ANTIDIARRHEAL DRUG, or, paraphrasing the authors, food is the real "super" ORS.

I have for some time been saying that food is as important in diarrhea treatment for its role in rehydration, as for its role in maintaining nutrition and promoting more rapid healing of the intestinal cells.

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This report begins the job of demonstrating that hypothesis.

During the first 24 hours, when no food was given, the children given the ORS based on rice starch had a real reduction in stooling, compared to the glucose-ORS group. With the addition of food during the second 24 hours, the two groups became indistinguishable. To state that another way, the data suggests that giving food along with glucose ORS has the same effect as giving rice-based ORS - both approaches appear to reduce stooling.

Now, to be rigorous, the study design does not permit us to go so far as saying, "food plus electrolytes and water is as effective in rehydration as glucose-ORS or rice-ORS." There was no group in the experiment that received only water as the fluid. But two of the authors (AMM and JR) have studied a couple of patients making that sort of comparison, and their results do not contradict that hypothesis. We hope a full study will be carried out soon.

I do not wish to imply by my remarks that we should be aiming at doing away with ORS, and just using water along with food plus electrolytes: not at all. ORS provides a uniform mixture of water, electrolytes, and the absorption-stimulating substrate. Food plus salt with water would almost inescapably not be so uniform. First would come the fluid, then the food and salt - what reahed the small intestine would doubtless vary quite a bit in composition, and therefore in stimulating absorption, despite the mixing that would occur in the stomach.

Add another cosideration: using ORS keeps the user focused on rehydration, on the importance of replacing the fluid that has been lost, volume for volume. That focus, that emphasis might be lost if we switched to a food plus water approach. Using a rice-based ORS, this study suggests, would allow us to keep the emphasis on fluids and rehydration, while getting the additional anti-diarrheal benefits of a food-based approach. [RSN]

Shahid, N.; Sack, D.; Rahman, M. et al. "RISK FACTORS FOR PERSISTENT DIARRHOEA." British Medical Journal, October 22, 1988, vol. 297, 1036-1038.

Summary

Studies have shown that more than half the deaths due to diarrhea can be attributed to chronic, or persistent, diarrhea. The authors undertook a retrospective analysis of persistent diarrhea (defined as lasting more than 14 days) of a systematically sampled group of patients aged 5 years or less attending the ICDDR,B clinical research center during the period 1983-85. Of the 4,155 children who participated in the study, 10% suffered from persistent diarrhea, with no detectable differences in sex or season. In terms of treatment, 18% of the patients with persistent diarrhea required admission to the medical ward, as opposed to only 8% of those with acute diarrhea. However, patients with persistent diarrhea were less likely to be dehydrated.

In contrast to children with acute diarrhea, those with diarrhea lasting more than 2 weeks were more likely to have bloody or mucoid stools, a history of previous antibiotic use, night blindness, vitamin A deficiency, and malnutrition (weight/height F% of the median of the NCHS standard). Pathogens found in the stool were not signficantly different from those found among acute diarrhea patients. Breastfeeding was found to be less common among those suffering from persistent diarrhea.

The authors cite several limitations of the data: reliance on recall of the parents for information on duration of diarrhea, antibiotic use and dietary history; inability to separate cause from effect in many of the cases; collection of fecal specimens late in the illness; and use of patients with acute diarrhea as a control group.

Editorial Comment

A study of this sort using ICDDR,B patients may show substantial differences in the proportions of various characteristics from the actual situation in the community. This is because of the general selection bias from using patients seeking care at a health facility. It may be further skewed in this case, however, because of the perception of ICDDR,B as the "cholera hospital", a place to go if you have the acute rapidly-dehydrating type of diarrhea familar to the public as cholera.

Nevertheless, it is interesting to note that 61% of those with persistent diarrhea did have some degree of dehydration on presentation, despite the fact that only 53% had watery stools. That more of the persistent diarrhea patients than the acute were not dehydrated is easy to understand--in contrast to the acute patients, they probably came because their diarrhea was persistent, not because of dehydration and its symptoms.

I was surprised that amoebiasis was not even mentioned as an etiologic agent, and giardia was present in only 4% of the persistent patients (the same as in the acute!). Is this real, or does it result from the stool examination procedures used?

Fully 16% had evidence of vitamin A deficiency (night blindness or conjunctional xerosis) compared with only 6% in the acute group. And 8% were wasted (F% wt/ht) compared to 3% in the acute group. While the retrospective nature of the data limits the possible conclusions, it seems highly likely that pre-existing vitamin A deficiency and malnutrition played a role in the gut failing to heal, and the diarrhea persisting.

The authors note that in Matlab, where availability of treatment for dehydration is excellent, 50% of diarrhea-related deaths are now from persistent diarrhea. Certainly, this is an increase from the probable 20-30% of the general population. But, why is it not sub-

stantially higher? With excellent care, hardly any patients should die with acute watery diarrhea. Is dehydration still the cause of some of those 50% of deaths from acute diarrhea? [RSN]

Clemens, John D.; Harris, Jeffrey R.; Khan, M.R.; et al. "IMPACT OF B SUB-UNIT KILLED WHOLE-CELL AND KILLED WHOLE-CELL-ONLY ORAL VACCINES AGAINST CHOLERA UPON TREATED DIARRHOEAL ILLNESS AND MORTALITY IN AN AREA ENDEMIC FOR CHOLERA." The Lancet, June 18, 1988, 1375-1378.

Summary

"The impact of B subunit killed whole-cell (BS-WC) and killed whole-cell-only (WC) oral cholera vaccines was assessed in a randomised double-blind trial in rural Bangladesh. 62,285 children aged 2-15 years and women aged over 15 ingested three doses of one of the vaccines or placebo. During the first year of follow-up, there was a 26% reduction of all visits for treatment of diarrhoea in the BS-WC group and a 22% reduction in the WC group. The reduction of all admissions for fatal or severely dehydrating diarrhoea was 48% in the BS-WC group and 33% in the WC group. Overall mortality rates were 26% lower in the BS-WC group and 23% lower in the WC group during the first year, and reductions of mortality were observed only in women vaccinated at ages over 15 years. However, no differences in cumulative mortality were evident at the end of the second year of surveillance." [Journal abstract]

Editorial Comment

This paper takes vaccine trials in diarrhea prevention to the next logical and programmatically critical level, beyond the ability of the vaccine to prevent cases of diarrhea, to its ability to reduce the need for treatment (i.e., severity) and mortality.

From a CDD program's point of view, that is the major objective of a preventive program like vaccination. Most CDD programs are still primarily concerned with eliminating diarrhea deaths, and have not yet succeeded in that enough to switch to the objective of reducing diarrhea incidence only because it is an inconvenient nuisance.

The discussion section of this paper is particularly cogent, noting a number of reasons why these findings must be conservatively extrapolated to programs. The most obvious constraint is the limitation of usefulness to areas with lots of cholera: although the vaccine with the B-subunit of cholera toxin (BS-WC) does cross-protect against toxigenic Escherichia Coli (LT-ETEC), even it would not be likely to have nearly the impact seen in this report in an area without cholera. The incidence of cholera was particularly high in the study year.

The second constraint is the need for a perfectly run immunization program to achieve these excellent results. Three doses, and a perfectly run cold chain: how close can the usual routine immunization program, with its inevitable problems and often high drop-out rates, come to achieving these results?

Third is the fascinating finding that the mortality reduction was not among the children, the group likely to have the highest diarrhea incidence, but rather among adult women! The authors suggest that this may be due to the delays in a conservative area like Matlab in taking women for treatment of diarrhea. Without immunization, some of the women died. With vaccinating them, the reduction in diarrhea severity resulted in saved lives. Children, presumably more rapidly taken for help, did not show a significant mortality reduction from the vaccine. We might broaden that observation to note that easy access to effective diarrhea treatment, such as is available in Matlab, may eliminate any observable mortality reduction from diarrhea vaccines like these.

We should probably note that the three-dose requirement may make this vaccine rather useless as a rapid epidemic-control action. In an endemic setting, less than three doses may have a useful booster effect, at least in persons with previous exposure. Still, however, vaccination is not an appropriate response to a cholera epidemic. Ensuring easy access to effective treatment, and telling the public about ORT, are two methods much more likely to prevent mortality in such epidemics than vaccination, even with effective vaccines like these. Unfortunately, we still hear of governments wasting scarce resources on emergency vaccination programs as their major responses to a cholera epedemic. [RSN]

Levine, M.; Harrington, D.; Losonsky, G. et al. "SAFETY, IMMUNOGENICITY, AND EFFICACY OF RECOMBINANT LIVE ORAL CHOLERA VACCINES, CVD 103 AND CVD 103-HGR." The Lancet, August 27, 1988, 467-470.

Summary

In an effort to develop a new cholera vaccine that is safe, easy to administer, inexpensive, and highly protective after a single dose, researchers conducted a volunteer study of two live vaccines administered orally, strains CVD 103 and CVD 103 HgR. Taking a classic cholera bacterial strain, the authors deleted almost all of the genes (54%) responsible for making the toxic piece of the cholera toxin molecule. The resulting strain (CVD 103) was further attenuated and a marker was added, producing strain CVD 103-HgR. Given orally to volunteers in a single dose, both

strains elicited strong antibacterial and antitoxic serum antibody responses, and provided substantial protection of the volunteers against a challenge dose of pathogenic Vibrio cholerae. Strain CVD 103 caused mild diarrhea in 5 of 46 recipients, with mild cramps in only one; CVD 103-HgR bacteria lyophilized produced no side effects in 18 volunteers, and was excreted in the stool in only 28% of volunteers, less than with CVD 103.

Editorial Comment

WHO has given top priority to efforts to develop an effective cholera vaccine. These results look better than those obtained with another preparation, a killed vaccine given orally along with a purified toxin subunit (B). More volunteer challenges were done with volunteers immunized with the CVD 103 strain. Protection was good, and even in those 5 volunteers who did get clinical cholera, they did not have severely dehydrating diarrhea. So the approach was successful in preventing severe disease, while allowing infection and immunogenic stimulation to occur. The next step is to take these strains to endemic areas, first to test their safety and the incidence of side effects, such as mild diarrhea in healthy adults and children. If the results from this are good, a field trial to test protectiveness can be done.

Clearly, these vaccine strains do themselves produce diarrhea in some persons, despite the efforts to remove their toxic components. These will have to be weighed by committees first, later by volunteers, then by parents, against the protection they confer against potentially fatal cholera. In contrast to the experience with the remarkably safe and protective viral vaccines such as mumps and measles, or diphtheria or tetanus toxoids, cholera vaccine researchers are having a much more difficult time getting a strain which provides adequate immunity in the gut (the old approach of injecting killed bacteria did not), and produces enough of an infection to stimulate this immunity without stimulating diarrhea as well. It seems that the bacterial factors (toxins, adherence, etc) which make a bacterial strain able to "take," that is, to cause an immunogenic infection, may be also the factors which cause diarrhea! [RSN]

Health Systems Research

Competition: winning article

A. Joseph, S. Abraham, S. Bhattacharji,
J. Muliyil, K.R. John, N. Ethirajan, K. George,
& K.S. Joseph

Improving immunization coverage

A study was made on the causes of unsatisfactory progress in immunization coverage in an area of Tamil Nadu, southern India. The findings led to the appointment of additional community health workers, the improvement of their supervision, the enhancement of accessibility to services through an increase in the number of peripheral clinics and the organizing of temporary clinics, and the concentration of effort on underprivileged groups. As a result, immunization coverage was more than doubled.

The Community Health and Development Project in Tamil Nadu, southern India, is a primary health care programme covering 128 square kilometres and serving 68 villages with a population of approximately 85 000. The region is semi-arid and predominantly rural, the economy being heavily dependent on agriculture and related industries. In 1981 the programme functioned with a base hospital and 3 peripheral clinics. The base hospital dealt with about 100 outpatients and 40 inpatients daily and with 60 deliveries every month. The peripheral clinics were conducted on a weekly basis by community health nurses; a doctor was in attendance at each clinic every second week. At the grass-roots level, community health workers each served a population of some 1500 and were supervised by auxiliary nurse midwives, who each covered about 5000 people. At the next level, for approximately every 15 000 people a community health nurse and a doctor were available. Immunization was given on a routine basis at the peripheral clinics, and, in addition, mass immunization campaigns were conducted periodically. The health education and rural development components of the programme were

Dr A. Joseph is Professor and Head, Dr Abraham is Associate Professor, Dr Bhattacharji and Dr Muliyil are Readers. Dr John, Dr Ethirajan and Dr George are Lecturers, and Dr K.S. Joseph is Research Officer in the Department of Community Health, Christian Medical College, Vellore, Tamil Nadu, India 632 002.

Table 1. Coverage of population under five years of age with third dose of diphtheria-pertussis-tetanus vaccine

Year	Population under five years	% population given third dose
1981	8571	37.1
1984	9048	51.4

implemented by staff who supervised workers in the villages. Two to three years after this strategy was mounted there were clear indications that it was not yielding dividends at the expected rate. Table 1 shows the improvements in immunization coverage that occurred between 1981 and 1984, and Table 2 the changes in the utilization of diphtheria-pertussis-tetanus vaccine from 1981 to 1986. A quarter of the children who received an initial dose of this vaccine in 1984 failed to take the second dose and more than a third did not complete the course of immunization. An investigation was therefore made into the causes of the inadequate improvement in immunization coverage.

Methods

The reasons for nonacceptance or dropout were discussed with staff and various members of the community. A special effort was made to obtain the views of staff working at the periphery, particularly the community health workers.

The area was divided into four sectors. The community health workers, auxiliary nurse midwives, community health nurses and other development staff in each were brought together, and the community health workers were required to identify the specific factors affecting immunization coverage. Discussions were initiated in mothers' clubs and youth clubs and in meetings with village leaders. The matters raised were further considered by the supervisory staff. Studies were carried out to clarify doubtful issues. Statistical analyses were performed to test hypotheses that emerged during the discussions.

The process of identifying problems through review meetings was continued subsequently. The staff of each sector met monthly to discuss the effect of any changes that had been implemented. Operational flexibility was thus achieved at the periphery through partial decentralization of the decision-making process. These meetings also provided feedback on deficiencies in the programme.

Results

Poor immunization coverage was caused by various factors, the influence of any one of which appeared to differ from place to place. Nevertheless, it was possible to identify the following critical elements.

- *Inadequate supervision of community health workers*

Table 3 shows that although coverage with diphtheria-pertussis-tetanus vaccine was better in villages with community health workers than in those without them, the

Table 2. Utilization of immunization services 1981–1986

Year	No of doses given DPT[a]-1	No of doses given DPT[a]-2	% compliance for DPT[a]-2	No of doses given DPT[a]-3	% compliance for DPT[a]-3
1981	1030	743	72.1	499	48.5
1982	1085	807	74.4	637	58.7
1983	1523	1123	73.7	1016	66.7
1984	1657	1238	74.7	969	58.5
1985	2024	1621	80.8	1382	68.3
1986	2299	1989	86.5	1625	70.7

[a] Diphtheria-pertussis-tetanus.

Table 3. Immunization coverage in areas with and without community health workers, 1981 and 1984

	1981		1984	
	No	%	No	%
Villages with community health workers				
Population under five years	6138	—	6461	—
Completed DPT[a]-3	2391	38 9	3452	53 4
Improvement 14.5 %				
Villages without community health workers				
Population under five years	2433	—	2587	—
Completed DPT[a]-3	792	32 6	1202	46.5
Improvement 13 9 %				

[a] Diphtheria-pertussis-tetanus

improvement between 1981 and 1984 was similar in both categories of village. This was attributed to poor supervision of and support for the community health workers. The programme had envisaged their supervision by auxiliary nurse midwives, who, however, were mostly unmarried young women not residing in the areas where they worked. It proved difficult to fill these posts, and the programme suffered because of a high staff turnover. The community health nurses, who each supervised 10 community health workers, could spend only about two hours a week with each worker, which meant that support was inadequate.

• *Scattered communities*

Villages in which the houses were clustered together were better acceptors of health messages than were those with houses scattered over large areas, which required a relatively massive effort for the achievement of the desired impact. Of the 12 villages having the poorest coverage with the third dose of diphtheria-pertussis-tetanus vaccine, seven had more than half their populations scattered over large areas. In contrast, of the 12 villages with the best coverage, none had their populations scattered to a similar extent.

• *Difficulty of access to health services*

It had been assumed that people would travel up to two kilometres in order to avail themselves of the immunization service, but this proved not to be the case. Table 4 illustrates how, in a given area, immunization coverage fell with distance from the peripheral clinic.

• *Low economic and educational status*

The more educated, progressive groups invited the health team and extended all possible support, whereas poorer groups, among whom traditional beliefs held sway, gave much less cooperation. In consequence, significantly better service was obtained by the former groups. This was especially marked within villages, where people of comparatively high caste and socioeconomic status had a much better record of health service utilization than people of lower caste and socioeconomic status. Thus the better-off people improved their lot further whereas the poorer people, in greater need of health care, failed to benefit proportionately. Clearly, the villages that gained most from the health services were the ones that cooperated with the programme and appointed community health workers to work for them.

Changes and benefits

In the light of the above observations, the following measures were taken.

- The number of community health workers was increased from 42 in 1984 to 57 in

Table 4. Immunization coverage in relation to distance from peripheral clinic

Village, year	Presence (+) or absence (–) of community health worker	Clustered or scattered population	Distance from clinic (km)	Coverage with DPT[a]-3 (%)
Kaniyambadi, 1984	–	Clustered	< 0.5	65.5
Kaniyambadi Kattupadi, 1984	–	Clustered	< 0.5	66.7
Kaniyambadi Pudur 1984	–	Clustered	1–2	49.2
Kilarasampet, 1984	+	⅓ scattered	2	29.5
Kilarasampet, 1987	+	⅓ scattered	< 0.5	63.2
Palavanzath, 1984	+	Clustered	2	46.7
Palavanzath, 1987	+	Clustered	<0.5	79.8

[a] Diphtheria-pertussis-tetanus.

1987, by which time all the villages were covered. The method of selection, involving community participation, was modified so that the persons chosen were acceptable to all sections of the villages.

- The post of auxiliary nurse midwife was abolished and a new category of staff was introduced to link the community health worker and the community health nurse. The persons chosen for this role were married women who were resident in the areas where they worked and had completed their secondary education. They were designated "health aides" and, after intensive training, each supervised the work of three or four community health workers.
- The number of peripheral clinics was increased from 37 to 45, and temporary clinics were held in areas with poor immunization coverage.
- Efforts were made to improve the service given to economically and socially underprivileged areas. Often this involved the screening of a health education film twice within the same village on the same day so that both the higher and lower castes could benefit.
- Greatly increased efforts were made to improve the health awareness of the people, by means of health education programmes, using film shows, drama, adaptations of folklore, and so on. Mothers' clubs, youth clubs, and village leaders were brought into the process.

Table 5 shows the improvement in immunization coverage between 1981 and 1987 and Table 2 indicates the increase in the use of diphtheria-pertussis-tetanus vaccine which occurred between 1981 and 1986. Between 1984 and 1987, immunization coverage increased by 30% as against 14.3% between 1981 and 1984. The level of immunization among children aged between 6 and 36 months in 1987 was over 80%. Periodic checks on the data were carried out by a team of field workers not involved in the programme. Cluster sampling techniques were also used to check the coverage.

The altered strategy was intended to benefit not only immunization coverage but also the

Table 5. Changes in immunization coverage, 1981–1987

Year	No. under five years	% population given DPT[a]-3
1981	8571	37.1
1984	9048	51.4
1987	8445	81.4

[a] Diphtheria-pertussis-tetanus.

other primary health care programmes of the Community Health and Development Project, and favourable effects were seen in antenatal care, compliance with chronic disease treatment, surveillance and monitoring, and other areas.

* * *

As a result of the study, immunization coverage was more than doubled. The gains realized from the deployment of community health workers were consolidated through better supervision. Accessibility to health services was enhanced by increasing the number of peripheral clinics and holding temporary clinics where necessary. An increased effort was made in villages with scattered populations. The programme was reorganized so that the socioeconomically weaker sections of the population received special attention. □

Said at the 41st World Health Assembly

WHO — the way ahead

The World Health Organization has emerged unscathed from the scrutiny which is being cast on all the United Nations system and has been judged as one which is doing a good job and moving in the right direction.

—Dr H. Nakajima, Director-General Elect in his acceptance speech, Fifth plenary meeting, 4 May 1988.

Dr Nakajima has demonstrated his dedication to the high goals of the World Health Organization and his commitment to the promotion of health and the control of disease. His effectiveness as a physician and as administrator are well known. We are confident that, under Dr Nakajima's leadership, this Organization will continue to make significant contributions to the improvement of health of people everywhere, in pursuit of WHO's noble goal of health for all.

—Mr D Newman (USA), one of the 88 delegates who took the floor to welcome Dr Nakajima's election as Director-General, Fifth plenary meeting, 4 May 1988.

FEBRUARY 1989

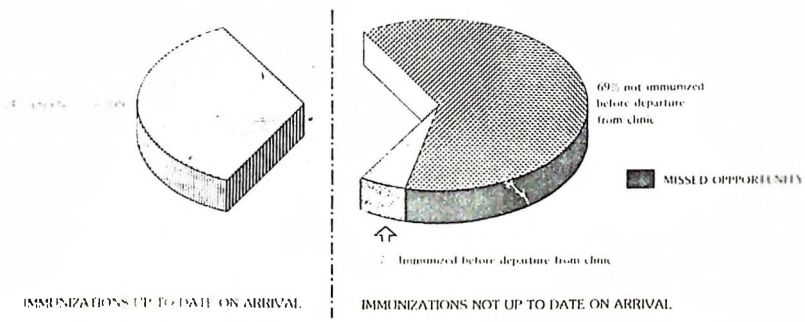
Missed Opportunities for Immumization:

Immunize at Every Opportunity

Highlights

- Many opportunities to immunize women and children are missed when:
  - Immunizations are not offered at every contact.
  - Immunizations are denied because of false contraindications.
  - Only one vaccine is given when the child is eligible for more than one.
  - Mothers are not being immunized when the child is immunized.

- Actions to reduce missed opportunities:
  - Identify missed opportunities by examining the health center records and immunization cards.
  - Perform surveys to measure missed opportunities.
  - Check the immunization status of every woman and child at each clinic visit. Those in need should be immunized before leaving.
  - Immunize children even at centers not specifically designated as immunization clinics, such as clinics for sick children.
  - Use every visit made by a woman to a health facility as a chance to immunize her with tetanus toxoid.
  - Avoid false contraindications to immunization. There are few real contraindications. Incorrect use of contraindications denies life-saving immunizations to many infants.



How opportunities are missed. This figure shows the results of a typical "missed opportunities survey": three quarters of those who attended a clinic for sick children were not up to date for immunizations on arrival. Only 7% of those who needed immunizations received any by the time they left the clinic.

WORLD HEALTH ORGANIZATION

The Problem

Many women and children in need of immunization do not come to immunization clinics but are seen at clinics treating sick people. This valuable chance to immunize is too often neglected by clinic staff. Even at immunization clinics, women and children are not being offered all of the antigens for which they are eligible.

An opportunity to immunize is missed when:

- Immunizations are not offered **AT EVERY CONTACT** that women and children make with health facilities such as attendance at an outpatient department, a hospital or an antenatal session in a maternity clinic.

- Immunizations are denied because of **FALSE CONTRAINDICATIONS** or improper immunization schedules. Mild fever, cough, diarrhoea or weight loss are **not** valid reasons for withholding life-saving immunization.

- **ONLY ONE VACCINE IS GIVEN** when the child is eligible for more than one vaccine (such as BCG and polio vaccine at birth). Mothers and children who present at the right time for immunization are being turned away because vaccines are out of stock or the vaccinator thinks too few children are present to justify opening a new vial of vaccine. It is worth opening a vial for even one child; it may be their only chance to be immunized.

- **MOTHERS ARE NOT BEING IMMUNIZED WHEN THE CHILD IS IMMUNIZED.** Tetanus toxoid should be given to all women of child bearing age at all opportunities. Whenever a child is immunized, the mother should be immunized with tetanus toxoid if she is not up to date.

How to Measure the Size of the Problem

Inspect Routine Data First

An examination of routine data may be enough to indicate whether a missed opportunity problem exists.

It is necessary to know only the date of the clinic visit, the birth date and the dates when immunizations were given. This information may be available in health records, immunization or "road to health" cards.

Also immunization coverage survey analysis may show whether all needed vaccines have been given at the earliest possible time.

Table 1.
Missed Opportunities at Clinics

Country of study	*Children needing but not receiving vaccine*
Pakistan, 1984	69%
India, 1985	57%
Nepal, 1985	54%
Honduras, 1987	45%
Indonesia, 1987	76%
Thailand, 1987	68%
Zimbabwe, 1987	0%
Comoros, 1988	58%
Egypt, 1988	30%
Ethiopia, 1988	41%
Pakistan, 1988	45%
Turkey, 1988	49%

Missed Opportunity Survey

There is a simple survey to measure missed opportunities for immunization at a health facility. It is based on interviews with parents and guardians as they leave a health facility. It shows if a child or mother failed to receive a needed vaccine, and the method is available from EPI.

Zimbabwe has developed an effective system for reducing missed opportunities at paediatric clinics. Each ill child is screened by a nurse for immunization status and the necessary immunizations are given even before the child is seen by the physician. In two clinic studies in 1987, this system reduced missed opportunities to zero.

Clinics where sick children are seen miss more opportunities to immunize than immunization clinics. One study in 1988 showed that 91% of eligible children did not receive immunization at a clinic for sick children compared with only 31% at an immunization clinic. Illness of the child was the commonest reason given by health workers for not immunizing.

Interviewing the staff will demonstrate why eligibles did not receive needed doses of vaccine. They may not have been screened, not refered, not immunized, or incompletely immunized.

Use Every Opportunity for Immunization

● Check the immunization status of every child and woman.

Screening of every woman and child for immunization status should be done as a routine at every contact with a health facility. Reducing missed opportunities is the cheapest way to increase EPI coverage.

Action:

Immunization cards should be issued to every woman and child.

Immunization cards should be checked at every visit to every health facility.

● Immunize children at clinics treating sick persons.

The most common reason for a missed opportunity is the belief by health workers and mothers that sick children cannot be immunized. Mild fever, malnutrition, diarrhoea and other minor diseases are not valid contraindications to immunization. There is no increased risk of side effects from the vaccines in these children. However, in such children the risk of severe disease, particularly measles, is increased.

When children come for treatment of an illness, preventive services should also be offered. When they are seen at clinics for medical problems, it is important that other needs of the patient and family are met at the same time. These should include immunization for the child and mother.

Infectious diseases can be transmitted at clinics where sick children and unimmunized children wait in the same areas. For example, following a measles epidemic in Côte d'Ivoire, it was estimated that two thirds of the measles cases seen at a paediatric clinic had acquired the disease during a previous visit to the same clinic. If the unprotected children were immunized, this would cease to be a problem.

Action:

Review national policy on contraindications.

Encourage doctors to provide preventive as well as curative services.

Educate mothers as to the importance of immunizations.

Immunize eligible children on admission and discharge from hospitals.

● Administer all appropriate antigens at each clinic visit.

Different vaccines can be given at the same time. A child should receive all eligible vaccines at the same visit.

Action:

Review the immunization schedule.

Open a vial of vaccine even for a single eligible woman or child.

Table 3.
Recommended immunization schedule to provide protection at the earliest age

Age	*Vaccine*
Birth	BCG and OPV
6 weeks	DPT and OPV
10 weeks	DPT and OPV
14 weeks	DPT and OPV
9 months	Measles

Table 2.
Summary of Indications and Contraindications to EPI Vaccines

1. Immunize children who are malnourished or mildly ill.
2. Immunize all women of child bearing age with tetanus toxoid. Early pregnancy is **not** a contraindication.
3. For children who have an illness requiring hospitalization, the decision whether or not to immunize should be made by the doctor admitting the child.
4. Give OPV, DPT and measles vaccines to children infected with Human Immunodeficiency Virus (HIV) or who have AIDS.
5. Do not give BCG to children who have a symptomatic infection with HIV.
6. Do not immunize children who have had a previous severe event after a previous dose of the vaccine.

● **Immunize all women of child bearing age at every opportunity.**

The problem of missed opportunities is particularly important for the prevention of neonatal tetanus. The worldwide coverage is 23% for pregnant women with two doses of tetanus toxoid. In many developing countries it is less than 10%.

A 1986 study in Indonesia indicated that only 21% of those who had attended antenatal clinics twice or more had received the necessary two doses of tetanus toxoid. If all opportunities to immunize had been used, TT2 coverage would have been at least 68%.

Women of child bearing age will frequently accompany their children to an immunization session or an outpatient clinic. In a recent study in Ethiopia, 99% of women who accompanied children to clinics to seek treatment for their child's illness were in need of tetanus immunization but did not receive it. Immunization services should be offered to the women at both of these occasions as well as at maternal and child health clinics.

"My mum needs immunizing too."

Action:

Give women two doses of TT with an interval of at least 4 weeks.

Immunize mothers when they accompany their children to an immunization clinic.

Immunize women when they are seen at, or accompany others to, a clinic for treatment of an illness.

Actions to Reduce Missed Opportunities

Think of immunizing a child even when being seen for another problem.

- Review the national immunization schedule to ensure that it provides optimal protection at the earliest age.
- Review the national immunization policy on contraindications. Most sick children and pregnant women can be safely immunized.
- Make immunization available at all clinics including clinics for sick children and maternal and child health clinics.
- Make sure all eligible women and children have an immunization card and that they bring the card to every clinic visit.
- Check the immunization cards of every woman and child at every clinic visit.
- Ensure that all women and children receive all vaccines that they are eligible to receive.
- Immunize on admission and discharge from hospitals.

BAC/DDC/78.1

ORIGINAL: ENGLISH

WORLD HEALTH ORGANIZATION

DIARRHOEAL DISEASES CONTROL PROGRAMME

ORAL THERAPY FOR DEHYDRATION IN ACUTE DIARRHOEAL DISEASES WITH SPECIAL REFERENCE TO THE GLOBAL DIARRHOEAL DISEASES CONTROL PROGRAMME

by

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1. Introduction

Oral therapy for diarrhoeal dehydration has a major role in the currently expanding global programme to reduce diarrhoea related mortality and malnutrition. Empirical clinical findings led to therapeutic recommendations and usage of oral rehydration in mildly dehydrated infants in the early 1950's, [1,2] and subsequent elucidation of the physiological mechanisms influencing intestinal absorption gave impetus to balance studies which have confirmed its utility in the treatment of acute watery diarrhoea of all etiologies and in all age groups.[3] The effectiveness of oral therapy in the rehydration of patients with mild or moderate dehydration and in the maintenance of hydration following intravenous rehydration of severely dehydrated patients is firmly based on many published reports of its use in hospitals and other treatment centres.

Much remains to be accomplished, however, before mortality due to diarrhoeal dehydration *per se* can be reduced to an achievable level of less than one per cent, particularly in developing countries where resources are scarce and basic health services are limited. For example, there is a need to consider the best means of ensuring the safety and efficacy of oral therapy when extending its use from treatment centres to simpler rural facilities (e.g. health posts, sub-centres) and to the home. Variations in local conditions, including the standard of education of the population, the availability of ingredients, the quality of medical supervision and the accessibility of backup facilities for referral need to be considered in devising programmes that will be perceived as beneficial by the community and by those responsible for evaluation.

To provide guidance for the development of implementation strategies for the global diarrhoeal diseases control programme, an attempt has been made to summarize the principles involved in the composition of oral fluid for rehydration and in the use of oral rehydration therapy according to patient age, and to make recommendations for the application of oral therapy and related research.

2. CHOICE OF ORAL REHYDRATION SOLUTION (ORS)

Many questions have arisen regarding the formula that should be recommended for the oral rehydration solution and on the best means for delivering oral rehydration therapy to those who need it most. Since 1971 WHO has recommended the use of a single solution (hereafter referred to as ORS) containing 3.5 g of NaCl, 1.5 g of KCL, 2.5 g of $NaHCO_3$ and 20 g of glucose in 1 liter of water, yielding the following concentrations: Na: 90 mmol/l, K: 20 mmol/l, Cl: 80 mmol/l, HCO_3: 30 mmol/l and glucose: 111 mmol/l. From the organizational and administrative point of view having a single formulation has the clear advantage of simplifying manufacture and distribution of the required ingredients and preventing confusion associated with multiple products. However, there needs to be flexibility in the use of this solution, particularly in infants who have unique requirements such as the need for more plain water.

The available controlled data regarding the use of oral rehydration have been derived chiefly from patients attending treatment facilities, and it would be prudent for programmes initially to emphasize activities that have been recommended on the basis of such data. Future studies may yield new data permitting recommendations on the most suitable methods for initiating oral therapy in the home. For the present it is recommended that national programmes be based on the existing health care facilities for use as diarrhoea treatment centres where simplified therapy can be supervised by personnel who have received training. Education of the mothers on proper nutritional practices, measures for the prevention of diarrhoea, and practical aspects of continued oral rehydration therapy at home should be given when therapy for dehydrated patients is initiated at such centres. Village health workers (VHW) must also be trained to initiate and supervise oral rehydration therapy and should likewise be able to educate mothers to continue the administration of oral rehydration at home in addition to providing guidance on dietetic management, when to seek medical care, and how to prevent the recurrence of diarrhoeal episodes. Health centres and trained local health personnel (VHE) should form part of an integrated referral system to provide backup facilities for the treatment of difficult or complicated cases.

3. PRINCIPLES OF THERAPY

Fluid and electrolyte therapy is given to remedy or prevent the physiological disturbances which accompany acute diarrhoeas of all etiologies. Water, mineral salts and a source of food energy are the ingredients. Except for the route of administration, the principles of oral hydration are the same as those for parenteral hydrations provision of water and mineral salts (electrolytes) to (i) replace prior losses (deficits), (ii) provide ongoing replacement of obligatory metabolic losses, and (iii) replace any losses produced by the continuing disease process.

There are also three main principles that must be considered in attempting to use a single oral solution in all situations. First, the presence of dehydration—that is, *having a deficit*—may require a solution with constituents different from those needed when *prevention of deficit*—i.e., *maintenance* of the hydrated state after repair—are the objectives. For example, deficit replacement (*rehydration*) necessitates more salt than does maintenance. A disparity may also arise if during the illness there has been intake of either excess water or excess electrolytes by the patient.

Secondly, the size and age of the patient influences the proportionate requirement for water as metabolic water losses are a function of energy expenditure. An *infant* (defined here arbitrarily as a child under 2 years of age) produces and expends heat energy, per unit mass, at 3 times the rate of an adult. The smaller the infant is, the greater is the disparity. Children (2 years to puberty) fall in between. This fundamental difference, imposed by size and the homeothermic nature of mammals, necessitates more water per unit mass for infants than for children or adults; thus a net lower concentration of solute, which is the sum of the total solute divided by total water administered in the same period, is desirable for the infant. Alternatively, one could recommend an ORS with a lower concentration of ingredients, but in adults this would require ingestion of inordinately large, probably unpractical volumes of the fluid to restore electrolyte losses adequately.

Thirdly, diarrhoeal diseases in general show great variability in rate of stool loss and consequently in concentration of sodium (range from 5-140 mmol/l) and potassium (10-75 mmol/l).

5.1 Infants

In order to deal with these considerations and still retain the simplicity of a single formulation, specifically different instructions are needed for the use of ORS in infants with non-cholera disorders, *particularly* those under 6 months of age or under 7 kg, body weight. In this regard some comments about the ingredients of ORS are in order.

Glucose: The glucose serves two functions: first, it facilitates sodium absorption via a coupling mechanism in the small intestine, and second, it provides carbohydrate calories and thus has a protein sparing effect and prevents ketosis. The glucose concentration of 111 mmol/l is probably the minimum necessary for these functions; more could potentially induce greater stool loss by an osmotic effect. Infants have incurred no special problems with this level of glucose.

Sodium: The sodium concentration of 90 mmol/l together with its accompanying anion presents the infant with a very high renal solute load. Experience has shown that an infant, particularly a small one (under 7 kg), ingesting only a solution of that concentration may become hypernatraemic, especially if it is under stress, has fever, is hyperventilating, or is living in high environmental temperatures or arid surroundings where insensible water losses may be high.

Other constituents: The other constituents, namely potassium, bicarbonate and chloride, are proper replacement ions to maintain cellular function and extracellular fluid composition; the concentrations are suitable for a wide range of encountered physiological disturbances.

To avoid hypernatraemia from use of ORS for this age group, it is generally necessary to provide additional water. One useful regimen for rehydration and maintenance has been to give 100 ml/kg/day of ORS and 50 ml/kg/day of plain water, interspersing the feedings at the ratio of 2 of ORS to 1 of water. An alternative of further diluting the reconstituted ORS itself may yield suitable sodium concentrations but suboptimal concentrations of the other ingredients thus requiring the addition of potassium, bicarbonate and glucose. In replacing losses in cases with a severe deficit, however, the full strength ORS may be used in an amount to meet the estimated deficit; the maintenance regimen for such cases should include the addition of plain water as described above (i.e. 2 to 1 regimen) except in profuse cholera-like diarrhoea where the ORS *per se* should be continued.

Rehydration therapy should include not only the safeguard of giving additional plain water but also the appreciation of the need for a distinct *endpoint* of therapy, however simplified, based on the patient's clinical appearance. It is most important to avoid both insufficient or excessive oral therapy with resultant underhydration or overhydration. Health auxiliaries, and as shown in some studies, even mothers, can be taught to differentiate sunken, normal and puffy eyes and to assess skin elasticity and/or turgor. When the patient's activity, strength and alertness, as well as appearance of the eyes, skin elasticity and turgor return to normal, and diarrhoea volume has diminished, feedings

at the breast or with diluted milk can be *substituted* for ORS and the patient observed. If profuse watery diarrhoea recurs, ORS can be resumed or feedings alternated with ORS. Infants old enough to take locally available foods other than milk should be encouraged to do so as soon as they desire.

During hydration therapy, dehydrated infants may not take enough volume because of anorexia or intractable vomiting. Under these circumstances recourse should be had to parenteral therapy. However, a small amount of vomiting should not lead to discontinuation of oral hydration therapy; instead the infant should be observed for 10 to 15 minutes to allow gastric emptying and oral rehydration resumed in small volumes.

Mothers whose infants need to continue oral therapy at home should be given instructions for proper mixing and administration and should be made to repeat these instructions before being allowed to leave the health facility. They should also receive instructions about breast feeding and diet during and after diarrhoea, particularly with regard to food items other than milk (weaning foods in the appropriate age goup).

3.2 Older age groups

Older children and adults have higher stool sodium concentrations (and lower potassium concentrations) and can be safely treated with ORS with extra water given when the patient desires. Patients with more severe diarrhoeas and in shock—e.g., cholera—should receive initial intravenous rehydration to restore blood pressure followed by ORS to complete replacement of the deficit (rehydration) and to replace continuing losses (maintenance); for maintenance therapy up to 1.5 times the volume of losses in diarrhoea and vomitus may be required to compensate for relatively higher stool electrolyte concentrations. Older children may need 250-500 ml/h and adults up to 750-1000 ml/h during peak purging periods.

Most mild or moderately dehydrated cases can be rehydrated within 6 to 8 hours with the ORS alone in volumes equivalent to 5-8% of body weight. This amount can be repeated if diarrhoea continues. Patients who vomit during the course of therapy should be managed as described for infants.

Diet can usually be resumed as soon as rehydration is complete; thus food should be offered early in the maintenance stage.

4. DISTRIBUTION OF ORS

Prepackaging of ingredients (pharmaceutical grade to ensure a long shelf-life) for a volume hat corresponds to that of readily available local vessels is, in our view, the best method for distributing ORS. When possible, packets should be prepared locally or on a regional basis. Large hospitals and reatment centres that are equipped with an adequate pharmacy and have the ingredients available an weigh them and prepare the oral solution in bulk for daily use. Estimates of ORS requirements ased on the existing demand and projected need should be made prior to embarking on such an ndertaking to maintain a continued supply.

A small-sized packet for a proportionately small volume of fluid (e.g., 500 cc) may be more ppropriate for infants under 6 months of age. This will offer a better control of the quantity of oral uid administered to infants, help prevent possible salt overload and avoid the use of left-overs.

Salt-sugar preparations made at home by mothers using such methods as "pinch and scoop", pecial spoons, domestic spoons, etc., should not be widely applied at present until further field studies ave determined the variability in the composition of such preparations and their safety and effectiveness for infants. Such methods should be subjected to rigorous evaluation with appropriate methodology (see section 5).

5. RESEARCH RECOMMENDATIONS

5.1 Various ways of preparation of oral solutions at home by the "pinch and scoop" method, or by special spoons, need to be carefully evaluated with particular reference to composition and efficacy.

5.2 The impact of early, including home, management of diarrhoea with ORS in reducing hospital referrals, mortality and diarrhoea-related malnutrition needs further elucidation.

5.3 There is a great need for studies of various methods of communication for teaching and training personnel at various levels, including mothers.

5.4 More studies on oral rehydration therapy of neonatal diarrhoeas are required to establish the basis for optimum recommendations for its use in this age group.

5.5 The use of amino acids such as glycine as substrates in conjunction with glucose to improve the absorption of ORS and reduce stool volume is an attractive field of study.

5.6 A search for bases or base precursors other than bicarbonate—e.g., lactate, citrate, acetate, etc., with particular reference to their efficacy and shelf-life when packaged with other ingredients, would be useful.

5.7 Further evaluation of ORS composed of sodium chloride, potassium citrate or acetate, and glucose (without bicarbonate) is another research area of interest since it would reduce the number of ingredients to three.

5.8 The absorption of magnesium and phosphate from oral hydration fluids in malnourished children would be a useful area for research.

6. SUMMARY AND CONCLUSIONS

6.1 Widespread use of oral rehydration therapy should form the major strategy in the global diarrhoeal disease control programme. Backup facilities should be available for treatment of the few severely dehydrated or otherwise complicated patients who require parenteral therapy.

6.2 From an administrative viewpoint there is a clear advantage in having a single formulation for the oral rehydration fluid. The WHO recommended composition is suitable for use in all age groups and in all acute watery diarrhoeas. It may be used in infants provided it is given appropriately with additional plain water and stopped at the proper time. Education and training of health personnel at all levels is essential to ensure proper use of oral therapy which should include dietetic management during and after an episode of acute diarrhoea, particularly in infants.

6.3 Packaged ingredients for an appropriate volume is the best method of distribution of ORS. Whenever possible, these should be prepared locally from pharmaceutical grade ingredients. Large treatment centres may prepare the oral rehydration solutions in bulk and need not use packets. A small-sized packet for a proportionately small volume of fluid may be better for use in infants.

6.4 A number of research priorities exist. The most important area is field evaluation of the accuracy of mixing, safety and efficacy of oral solutions made from household salt and sugar by mothers in the home.

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DIARRHOEA

07 So you think that diarrhoea is a simple ordinary disease not worth bothering about ! Do you know that a child dies of it every six seconds somewhere in the world? In India, 1.5 million children die of diarrhoea every year. Miss 2 turns to think about this killer disease.

11 Well, I am not surprised that you have diarrhoea today. That vendor's stall may look very tempting with those beautifully cut slices of water melon and fruit chaat. But did you notice the flies? Go back 4 steps.

15 Miss a turn to learn how to prepare the ORT solution. In one glass of water, put a pinch of salt and one tablespoon of sugar. If you have a sour lime, a lemon, squeeze in a few drops.

20 You have diarrhoea, and yet you are happily eating pakoras, samozas and tikki. Don't you know that oily food is not good for someone suffering from diarrhoea ? Miss a turn.

22 Did you get diarrhoea after taking those tetracycline tablets? Miss 2 turns to tell your doctor this. Certain drugs cause diarrhoea as a side effect. Watch out for this.

26 Several children in this holiday camp have diarrhoea. I notice many eat without washing their hands. And the cook, does he wash his hands ? Go back 4 steps. YOUR negligence is the cause of diarrhoea among the children.

30 Yes, many bottle fed babies suffer from diarrhoea. Why aren't you advising mothers to breast feed their babies instead of bottle-feeding them? Go back 5 steps.

34 Advance 5 steps for motivating people in the village to cover their toilet with earth as cats do. When these toilet 'piles' dry, they are broken up and scattered by the wind and the rain contaminating uncovered food and water.

38 People die of diarrhoea because they do not have enough water left in their bodies. They die of dehydration ! Advance 4 steps to the areas where there is diarrhoea epidemic.Encourage people along your route to take enough fluids and salt to make up for the fluids and salt lost with each watery stool.

40 You have noticed that your younger brother, Ramu, often has diarrhoea. Advance 2 steps to the hospital laboratory taking with you a specimen of his stools. He may have a worm infection. Those suffering from intestinal worms often have diarrhoea.

43 There are several cases of diarrhoea in this hostel. Miss 2 turns to prepare three jugs each of rice water, buttermilk and nimbu pani. Add some salt to each jug. Encourage those suffering from diarrhoea to choose any one of these three drinks and to sip it very slowly at intervals during the day.If they gulp it down or drink it quickly, it could start a bowel movement.

48 Go back 3 steps. Don't you know that severely malnourished children find it difficult to digest milk ? Why give them milk when it can cause them diarrhoea? Dilute the milk if you must give them some.

51 Have another turn if you can name 4 causes of diarrhoea.

54 Have you stopped drinking water, or any other fluid, because you think you will have more watery stools? You are

making a huge mistake. Miss a turn. Continue to take fluids otherwise you will get dehydrated. Remember, however, to take only a few sips at a time.

58 As you are fortunate to live in a place where coconuts are easily available and inexpensive, give the patient tender coconut water. It is the most sterile and nutritious drink you could give him. Move 4 steps ahead to collect half a dozen coconuts for him.

61 Grandmas once said that anyone having watery stools should not eat. Today we realize that we MUST eat. Take soft, boiled unspiced non-greasy foods : rice, dal, porridge, arrowroot, sago pudding or apples boiled with cloves and sugar. Miss a turn to spread this message.

63 Advance one step forward to buy some over- ripe bananas for your neighbour who has diarrhoea. Over-ripe bananas are good for diarrhoea. But unripe fruit can cause diarrhoea.

65 You are inviting trouble by eating sweets from the vendor's cart around which buzz dozens of flies. Go back 5 steps. Coax the vendor to cover the sweets he sells ? He could then continue to earn a living without spreading illness with his sale of contaminated sweets.

68 You did well to tell people about yet another natural remedy for diarrhoea. Congratulations! Move three steps forward. A teaspoonful of a mixture of poppy seeds and crystasl sugar helps to check diarrhoea.

72 Miss 2 turns if you cannot explain why it is very important to keep drinking while you have diarrhoea. If you can, you may move ahead 4 steps.

75 Boil a few well-washed guava leaves in 2 cups of water. Continue to boil these until the water is reduced by half. Advance 4 steps to tell everyone about this good remedy for diarrhoea.

78 Bravo ! Your ORT stall at Allahabad railway station during the Kumbha Mela and at the pilgrimage site did marvels to help hundreds of pilgrims suffering from diarrhoea. Have another turn as a reward.

83 Miss a turn to look at a serious case of dehydration at the hospital. The eyes are sunken and dry.The tongue is also dry. The skin has lost its elasticity. He is cold and his breathing is deep and rapid. He has not passed urine for several hours. He is drowsy as well.

86 Move ahead 3 steps to show people how to make this good remedy for diarhoea. Roast 2 tablespoons of raw rice in a pan. Then boil the roasted rice in 2 cups of water until there is just half the quantity of liquid left in the pan. Cool it and then sip it slowly.

90 Move forward 2 steps to spread the message that black tea made with a little ajwain is also good for diarrhoea.This is yet another natural remedy for diarrhoea.

96 Roast a teaspoonful each of methi seeds, jeera and ajwain in a pan and then powder it. Divide the powder into three doses, mixing each with a cup of curd. Add a little salt. Take it thrice a day. Move 4 steps back telling people about this remedy for diarrhoea.

99 My mother gave me a cup of curd mixed with a teaspoon of dry ginger powder and some salt. That put an end to the diarrhoea. I now feel well enough to jump 4 steps forward.

102 Have another turn if you can explain why salt should be added to the ORT solution or to any fluid taken by someone suffering from watery stools. Miss 2 turns if you cannot.

105 Move ahead 4 steps if you can repeat any 4 natural remedies for diarrhoea. If you cannot, miss 2 turns.Try to listen carefully when these are read out as the game continues.

107 Excellent! You have noticed that the soft spot in the centre of the baby's forehead is sunken. This is a sign of dehydration. If you can remember the other signs of dehydration you can move ahead 5 steps ahead.

111 You have now been on Oral Rehydration Theraphy for five full days and you still have watery stools and fever. Miss a turn to have a stool test. You may either have typhoid, amoebic dysentry or intestinal flu.

114 As a chemist are you only concerned with selling your stock of medicines ? Are you not concerned about people's health ? How can you still sell Mexaform, Lomotil, Intestopan ? These anti-dairrhoeal drugs have been banned as they have a harmful effect on those who take them. Move back 3 steps.

118 Run ahead 5 steps and distribute these leaflets on SMON - a disease people developed after taking several tablets of anti-diarrhoeal drugs over a period of time. They went blind and slowly became paralyzed. People should know the risk they run when they take adti-diarrhoeal drugs.

122 Move ahead 5 steps. Tell everyone that the victims of SMON in Japan took Ciba Geigy to court in Japan and made the company pay them compensation for the disability they suffered as a result of taking the anti-diarhoeal drugs marketed by the company. However, Ciba Geigy continued to sell Mexaform in India despite this case in Japan. It claimed that our bodies were different !

126 Why are you encouraging the use of anti-diarrhoeal drugs ? Move back 3 steps. Don't you realize that these medicines seem to cure you and stop your watery stools almost immediately. However,they hide the body loss of fluids ?