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A. R. Samadi

M. R. Islam

K. M. S. Aziz



INTERNATIONAL CENTRE FOR  
DIARRHOEAL DISEASE RESEARCH, BANGLADESH

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A.R. Samadi<sup>1</sup>

M.R. Islam<sup>2</sup>

K.M.S. Aziz<sup>3</sup>

INTERNATIONAL CENTRE FOR  
DIARRHOEAL DISEASE RESEARCH, BANGLADESH  
G.P.O. Box 128, Dacca 2  
Bangladesh

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- 1 Programme Head, Disease Transmission
  - 2 Chief Physician
  - 3 Associate Director, Training & Extension

## PREFACE

The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) is an autonomous, international philanthropic and non-profit centre for research, education and training as well as clinical service. The Centre is derived from the Cholera Research Laboratory (CRL). The activities of the institution are to undertake and promote study, research and dissemination of knowledge in diarrhoeal diseases and directly related subjects of nutrition and fertility with a view to develop improved methods of health care and for the prevention and control of diarrhoeal diseases and improvement of public health programmes with special relevance to developing countries. ICDDR,B issues annual report, working paper, scientific report, special publication, monograph, thesis and dissertation, and newsletter which demonstrate the type of research activity currently in progress at ICDDR,B. The views expressed in these papers are those of authors and do not necessarily represent views of International Centre for Diarrhoeal Disease Research, Bangladesh. They should not be quoted without the permission of the authors.

## ABSTRACT

Diarrhoeal diseases form a major health problem in developing countries because of its high morbidity and mortality rate. The main cause of death in acute diarrhoeal diseases is dehydration, which can be prevented by replacement of water and electrolytes. Over the past three decades the study of acute diarrhoea in children and adults has led to important knowledge of the physiology of body fluids and intestine as well as efficacy of oral rehydration solution in treatment of dehydration due to diarrhoea. Another major problem in developing countries is lack of resources and trained personnel to cope with health problems. In this paper we are presenting the ICDDR,B model for treatment of diarrhoeal disease with particular reference to its organization, administration, staffing pattern, procedures for screening patients and methods for treatment. This model is an example that the trained paramedics and auxiliaries, under supervision of a physician can run a large treatment centre for diarrhoeal diseases efficiently. The other aspect of this model is the successful use of oral rehydration solution in treatment of majority of dehydrated patients. This model can be adapted to suit local situations in any developing country where resources and trained personnel are limited.

## INTRODUCTION

Diarrhoeal disease forms a major health problem in developing countries. Acute diarrhoea affects about 750 million children aged below 5 years in Asia, Africa and Latin America each year; it is estimated that three to six million in this age group die annually (1). In addition diarrhoea leads to malnutrition increasing the death toll (2). The main cause of death in acute diarrhoeal diseases is dehydration, which can be prevented by replacement of water and electrolyte.

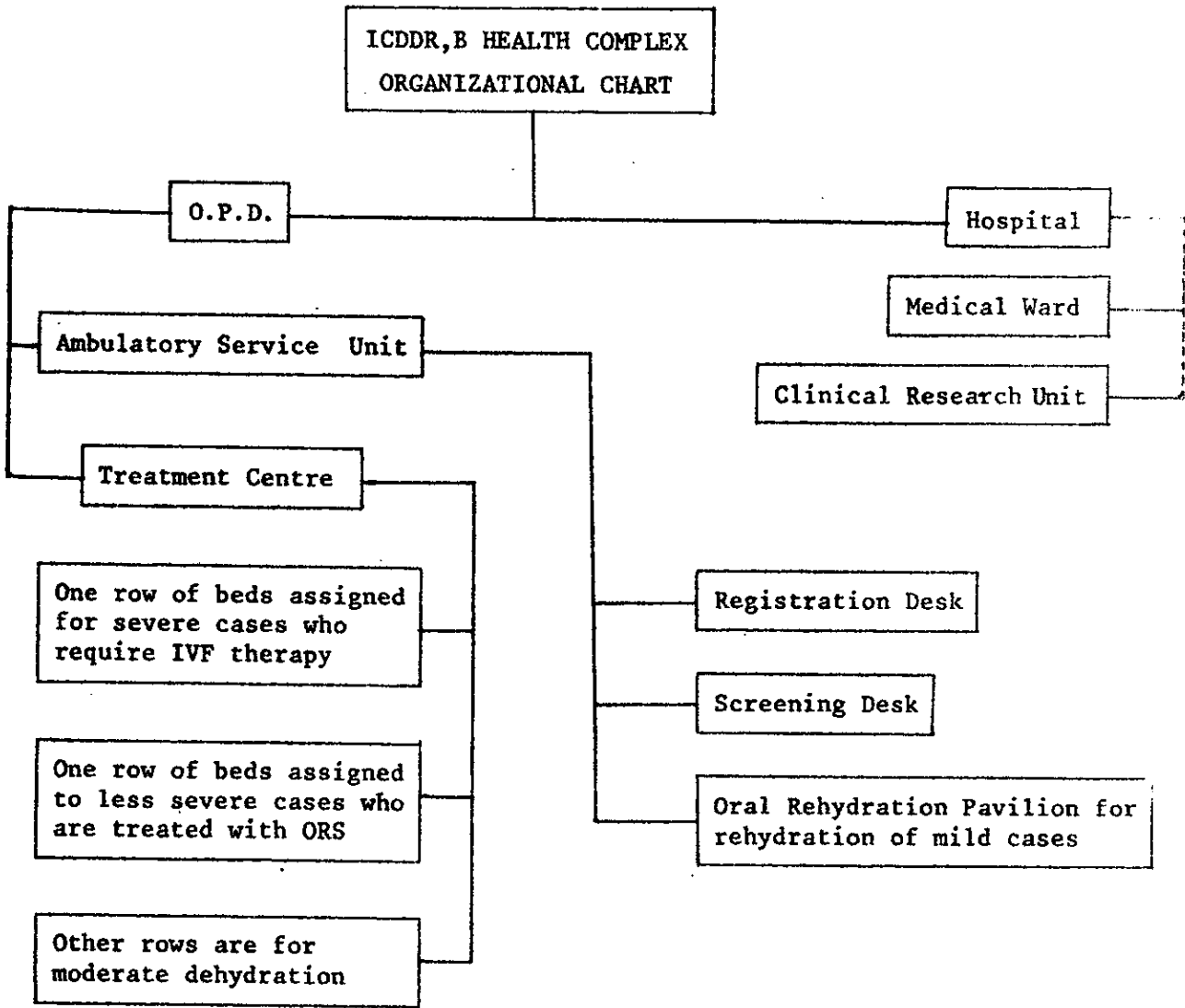
Over the past three decades the study of acute diarrhoea in children and adults has led to important knowledge on the physiology of the body fluids and intestine as well as therapy. Oral rehydration based on the knowledge that glucose enhances the absorption of sodium and water was first used in 1968 in adults (3,4) and later in older children with acute infectious diarrhoea (5). Further studies included infants over three months of age with non-cholera diarrhoea (6,7,8). A number of studies have recently confirmed the safety of oral rehydration therapy in treatment of infantile non-cholera diarrhoea (9). A recent study demonstrated that neonates can successfully be rehydrated with standard Oral Rehydration Solution (ORS) (10). WHO advocates use of standard ORS for treatment of dehydration due to diarrhoea in all age groups including young infants, because of its efficacy, simplicity, uniformity and cost-effectiveness (9).

Another common feature of developing countries is limitation of resources, trained personnel and lack of health facilities. This often causes overcrowds in the hospitals and consequently delays the treatment of dehydrated patients. In such circumstances the developing countries ought to develop some methods, utilizing paramedics and auxiliaries for delivery of health care with a view to reducing mortality while decreasing both overcrowding and the cost of health care. In this paper we present the ICDDR,B model for treatment of diarrhoeal diseases which can be adapted in other developing countries.

## ORGANIZATION

The ICDDR,B Health Complex, Dacca consists of an Outpatient Department (OPD) and the Hospital. The hospital is divided into two units, the Medical Ward for intensive care of complicated diarrhoeal diseases and the Clinical Research Unit. The OPD is composed of two units, the Ambulatory Service and the Treatment Centre. The Ambulatory Service has Registration Desk, Screening Desk and Oral Rehydration Pavilion. The Treatment Centre provides services to the patients who are admitted with uncomplicated diarrhoeas. ICDDR,B Health Complex, Dacca serves about 100,000 patients annually free of charge (11). Figure 1 shows ICDDR,B Health Complex organizational chart.

FIGURE 1



## Hospital

*Medical Ward:* The medical ward is capable of providing intensive care to 50 cases of diarrhoea with complications. Complicated cases are defined as patients' primarily suffering from diarrhoea and are associated with acidosis, hyponatremia, hypernatremia, hypokalemia, hypoglycemia, chest infections, septaemia, abdominal distension, rectal prolapsus, severe PEM, hyperpyrexia (>39°C) etc.

*Clinical Research Unit:* The clinical research unit is involved in research on different aspects of diarrhoeal diseases.

## Outpatient Department

The OPD is in fact a model of rehydration centre designed on the basis of ICDDR,B continued research results over the last two decades. This model can be replicated with some modification to fit individual situation in other developing countries where diarrhoeal disease is an important health problem, resources are limited and professional personnel are scarce. On an average OPD serves 250-500 patients per day.

*Ambulatory Service Unit:* Organizationally this unit has been split into three areas:

1. *Registration Desk:* The registration desk is located in the entrance of OPD and is run by a clerk. The name, address and other specification of the patient is registered by the clerk and the patient is directed to the screening desk.
2. *Screening Desk:* The patients are examined in the screening desk by the paramedics (registered nurses, non-registered trained nurses) who have been well trained in the management of diarrhoeal diseases. The main function of the paramedics is (a) to screen out the patient according to severity of disease; (b) to provide treatment or refer to appropriate area for immediate care; and (c) to reduce unnecessary waiting time of dehydrated patients in the waiting area.
3. *Oral Rehydration Pavilion:* ORP is in a corner of the OPD where benches and tables have been put for patients with mild dehydration to drink Oral Rehydration Solution (ORS) for a few hours.

*Treatment Centre:* Treatment Centre is a large room about 40 x 40 meters where cholera beds have been placed. Uncomplicated diarrhoea cases with moderate/severe degree of dehydration are admitted to Treatment Centre for either intravenous fluid (IVF) therapy or oral rehydration. All cases of severe dehydration in shock, with persistent vomiting, unable to

drink or moderate cases not deemed safe to be treated with ORS alone due to high purging rate are treated with IV fluid. Patients with less severe dehydration who are able to drink and moderate cases of dehydration are treated with oral fluid. The Treatment Centre has a capacity of 75 to 100 beds.

## ADMINISTRATION

### Staffing Pattern

OPD is mainly staffed by a physician, paramedics (registered and non-registered trained nurses) and *ayahs*\*. The physician is in charge of consultation. Registered or non-registered trained nurses are responsible for screening the patients, giving IVF and supervising the work of *ayahs*. *Ayahs* prepare oral rehydration solution in large quantities. The attendants of patients administer ORS with the help of the *ayahs*. *Ayahs* under the supervision of trained nurses are capable of assessing the state of dehydration. One nurse is responsible for IVF administration and another is in-charge of the supervision of the work of *ayahs*. Functional component of ICDDR,B model is shown in Figure 2.

### Supervision

The overall technical supervision is carried out by the physician-in-charge. The administrative supervision is performed by the assistant matron who is a registered nurse. Nurses supervise the work of *ayahs*. For better supervision, the patients who receive IVF are put in one row. Similarly the beds for patients with less severe dehydration who are treated with ORS, are put in another row in order to enable the nurse to supervise these patients very closely. The rest of the beds are for moderate degree of dehydration who need less supervision.

### Procurement of Personnel

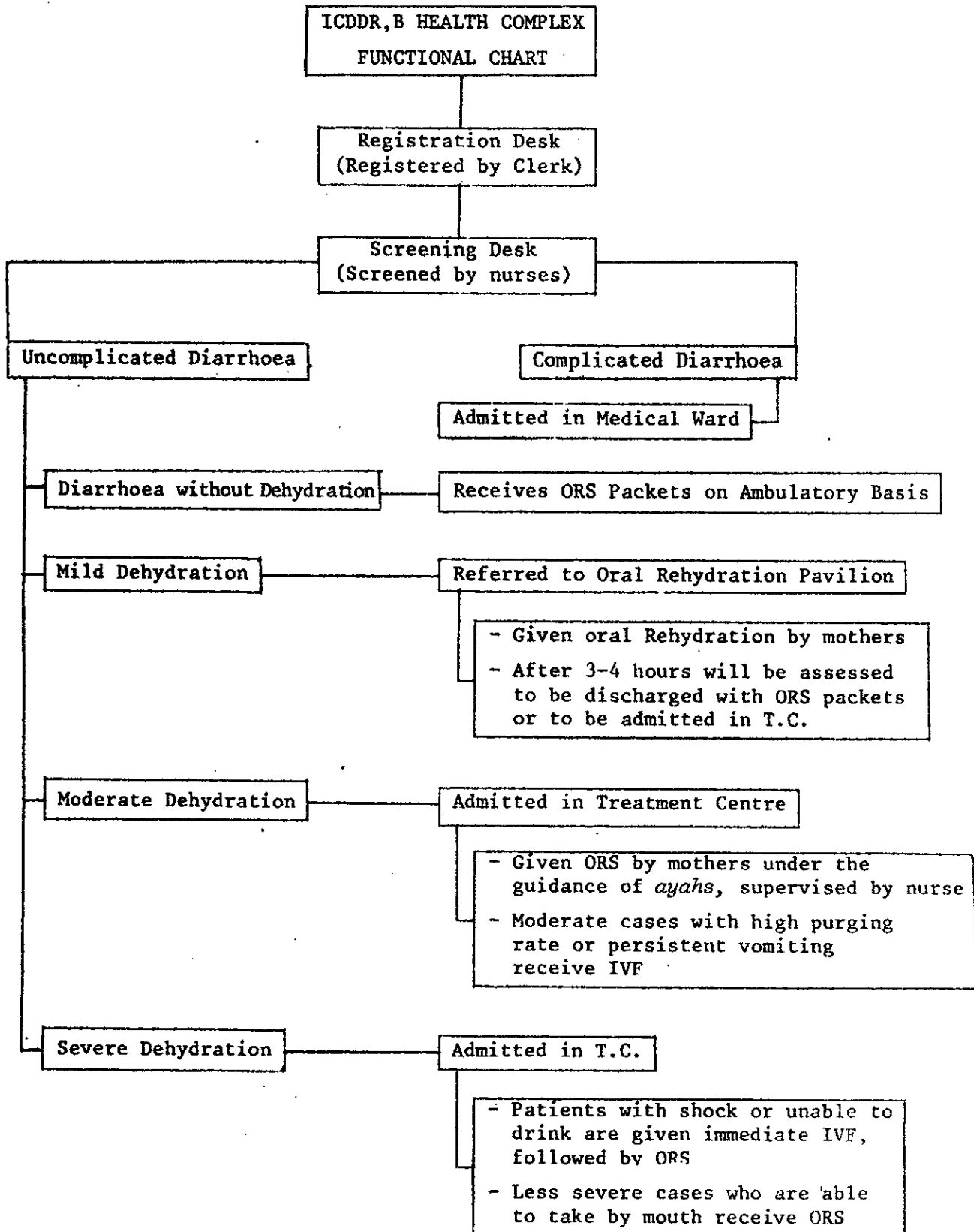
Young women without any formal education are picked up from different unions of the community after consultation with the chief of the union. They are trained in groups for 3 weeks in ICDDR,B by nurses and sent back to the community for treatment of diarrhoeal diseases. Some of these trained women are recruited as *ayahs* by ICDDR,B for the OPD.

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\* Generally women without formal education trained as medical attendants.



FIGURE 2



## PRACTICAL MANAGEMENT OF PATIENTS IN ICDDR,B OPD

### Registration Desk

The patient first comes to the registration desk in the waiting area by turn. The arrangement is such that every patient who enters the waiting area can be seen by the clerk-in-charge of registration. This enables the registration clerk to give priority to more sick patients. The patient is registered and a treatment form is given. This process does not take more than 2-3 minutes.

### Screening Desk

The patient goes to one of the screening desks where the nurses examine the patient to distinguish between complicated and uncomplicated diarrhoea. In case of any complication he refers the patient to the physician for consultation and admission to the medical ward. In case of uncomplicated diarrhoea the nurse screens for dehydration and categorizes the diarrhoeal patients according to degree of dehydration on the basis of the method recommended by WHO (1). Cases without visible signs of dehydration are given ORS packets and advice. Cases with mild dehydration are referred to Oral Rehydration Pavilion for ORS therapy and the moderate and severe cases are admitted to the Treatment Centre.

### Oral Rehydration Pavilion

Patients with mild dehydration are treated in the ORP with ORS. Mothers feed the ORS and are supervised by *ayahs*. ORS is given *ad libitum* to these patients. At the ORP, *ayahs* assess the dehydration status under the supervision of one nurse. The majority of these patients are discharged within two to four hours with ORS packets and advice. A very few patients, who could not be rehydrated because of high purging or vomiting are admitted to the Treatment Centre.

### Treatment Centre

The moderate and severe cases of dehydration are admitted in the Treatment Centre. The very severe cases who are in shock or moderate case with high purging rate are given IVF immediately by a nurse and put in the IVF row. After initial rehydration by IV fluid for 2-4 hours at a fast rate, oral rehydration is administered. The less severely dehydrated patients who are able to drink are given ORS as frequently as the patient can take and the amount of fluid intake is recorded for estimation of initial fluid replacement and maintenance. These patients are closely supervised by *ayahs* under the guidance of a nurse. The majority of these patients are rehydrated within a few hours. Few cases who cannot be rehydrated with ORS because of high purging or vomiting are transferred to

the IV row and are given IVF, followed by ORS. The moderate cases of dehydration are treated with ORS. ORS is administered by the mothers/ attendants of the patients. The amount of fluid for initial rehydration is calculated on the basis of body fluid loss: 50 ml/kg in mild dehydration, 60-90 ml/kg in moderate dehydration and 100 ml/kg in severe dehydration, are given within four hours. The amount of fluid for maintenance of rehydration is estimated on the basis of ongoing losses along with daily physiological requirements. In young infants two hours after initiation of rehydration, some water in a cup of 100 ml capacity is provided and the mother is advised, if the child is reluctant to take continuous ORS; as much water can be given from this cup as the child wishes. Sixty percent of patients in the Treatment Centre are discharged within 12 hours (12).

### Evaluation of Patient

Evaluation of patients receiving ORS is primarily done by *ayahs* under close supervision of nurses. In the Treatment Centre the patients are weighed on admission and again at the time of discharge. All stools passed by the patient are collected in a pail and measured every 12 hours. Temperature is recorded. The dehydration status of a patient is assessed periodically. Patients who are not rehydrated by ORS due to high purging or persistent vomiting are referred for IVF therapy. Patients developing complications or electrolyte imbalance are referred from Treatment Centre to Medical Ward for intensive care. Electrolyte imbalance is primarily diagnosed by simple clinical indicators. Hyponatremia is suspected when a child has severe thirst, parched tongue (13,14), puffiness of the eyelids during rehydration. In hyponatremia, the patients lose skin turgor with relatively moist mucous membrane and become very lethargic and sometimes semicomatose (14). Hypokalemia is manifested by signs of abdominal distension with sluggish bowel movements. Acidosis is suspected when the child develops rapid and deep respiration (14). After clinical indication, blood electrolytes are measured and the child is then transferred to medical ward. Figure 3 shows ICDDR,B model for rehydration and evaluation.

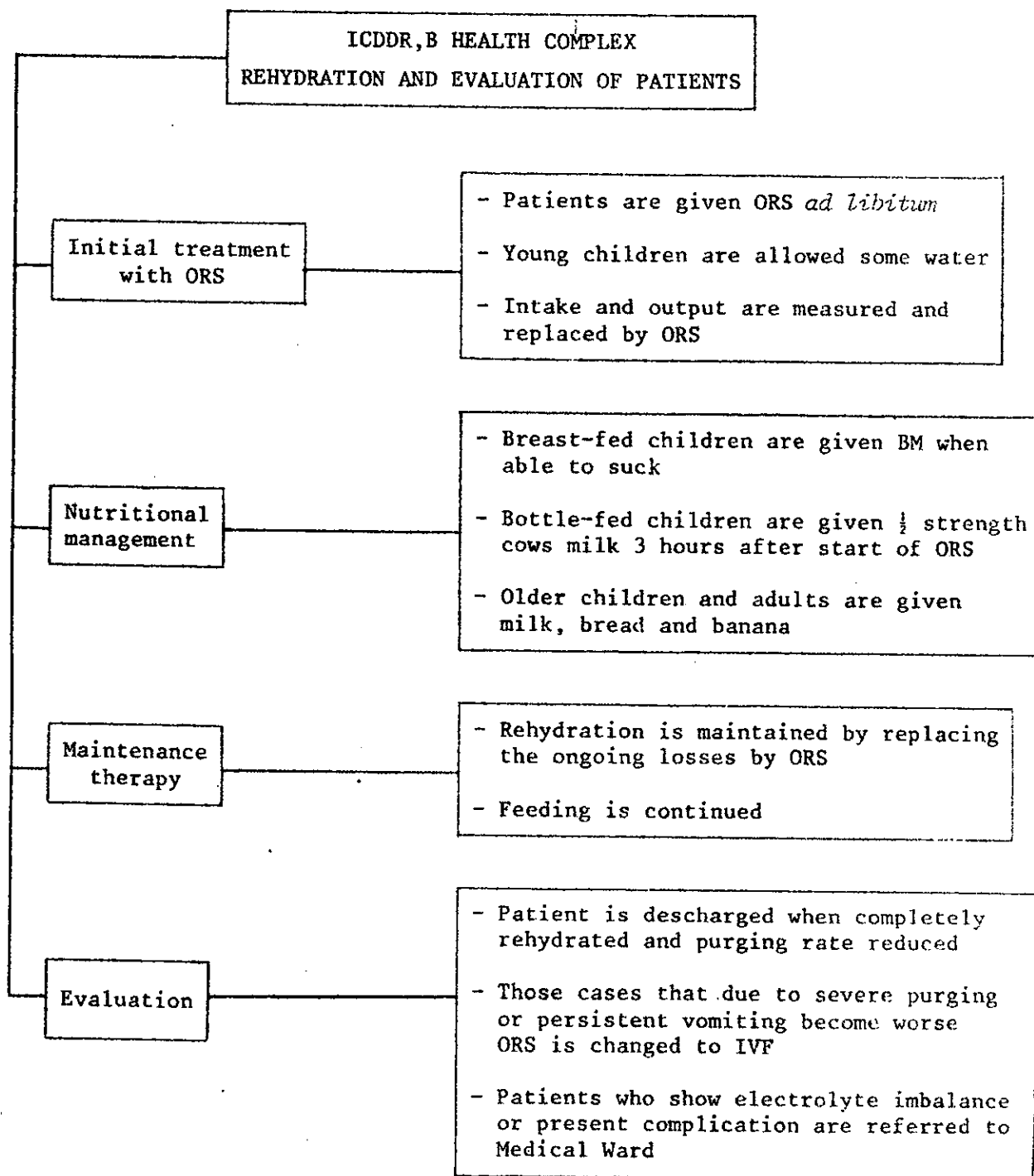
### Nutritional Management

Breast-fed children are given breast milk when they are able to suck. Bottle-fed children are given  $\frac{1}{2}$  strength cow's milk 3 hours after start of oral rehydration therapy. Older children and adults are given light diet (milk, bread and bananas).

### Etiological Screening

Patients who are clinically suspected for cholera, their stools are screened for *V.cholerae* by Darkfield microscopic examination (15). The positive specimens are cultured. Patients with mucoid and/or bloody stools who are clinically suspected for shigellosis or amoebiasis are screened for evidence of *Shigella* and amoebiasis. Presence of pus cells, RBC and macrophages are suggestive for shigellosis and their stools are cultured for *Shigella*.

FIGURE 3



## REHYDRATION FLUIDS AND DRUGS

The ingredients of the oral rehydration solution used by ICDDR,B are Na 90, Cl 80,  $\text{HCO}_3^-$  30, K 20 mmol, sugar 40 gms/litre (16). The ORS packets are prepared in the ICDDR,B by *ayahs* and its quality is checked by random sampling by the Biochemistry laboratory.

The intravenous fluid used in the Treatment Centre is acetate solution (17) containing Na 134, K 13, Cl 99, acetate 48 mmol/l.

Cholera is treated with tetracycline and furazolidone. Shigellosis is treated with ampicillin, trimethoprim-sulfamethoxazole. Amoebiasis and giardiasis are treated with metronidazole.

## HEALTH EDUCATION

Health education is given on prevention of diarrhoea, early treatment of diarrhoea at home, importance of breast-feeding and introduction of supplementary food, personal hygiene and family planning to mothers and attendants of patients.

## SURVEILLANCE ACTIVITY

A 4% systemic random sample is under surveillance for the study focused on etiological factors, clinical features and socio-economic conditions with a view to getting information on pattern of diarrhoeal diseases in the community.

## CONCLUSION

The ICDDR,B model for treatment of diarrhoeal diseases has been devised to suit Dacca Health Complex, Bangladesh where diarrhoeal disease is a major health problem. The model for screening of patients, use of paramedics and auxiliaries in delivery of medical care and simplification of treatment can be adopted with some modification to suit local situations in any developing country where resources and professional personnel are limited. This approach is not only economical but it will also reduce mortality from diarrhoeal diseases. The other merit of this model is to educate the mothers as well. Mothers attending sick children will learn at the treatment centre what to do when a child has another attack of diarrhoea.

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\* List of previous publications, such as, annual reports, working papers, scientific reports, special publications and thesis and dissertations, can be obtained on request. For further information, write to Head, Library and Publication Branch, International Centre for Diarrhoeal Disease Research, Bangladesh, G.P.O. Box 128, Dacca 2, Bangladesh.