Experience with 100 Diarrhoea Cases treated at Narayani Zonal Hospital Rehydration Therapy Centre, Birgunj

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Introduction--

Diarrhoeal disease is regarded as the biggest Killer of Children in our country¹

This is the second leading cause of death worldwide². All signs, symptoms, morbidity and

mortality in diarrhoea is due to fluid and polyelectolyte loss from the body. Accordingly

prevention and management of this great public health problem has begun to get

maximum attention not only by the affected countries but also reputed organisation like

W.H.O. I and Dr. I. B. Khatri, the Civil Surgeon of Narayani Zonal Hospital, Birgunj

the previlage of attending a course on Rehydration Therapy Centres held at Bangladesh

and Burma respectively, as a result of which a small rehydration unit was started in

Birgunj Hospital which was later converted into a regular Rehydration Therapy Centre.

I propose to present to you in this paper a brief report on our experience with 100

diarrhoea cases treated in this centre and recommendations to establish similar Rehydration

Therapy Centres all over the country.

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ETIOLOGY & PATHOPHYSIOLOGY OF ACUTE DIARRHOEAL DISEASES

Diarrhoeal disease is endemic in the developing world. The term 'Diarrhoea' is used to mean "an abnormal frequency and liquidity of faecal discharge" as defined in writing of Hippocrates³. Most these diseases occur in less than 5 years of age. The etiology of diarrhoea is not properly understood. Only less than 40% of the cases have recognised etiological agents.

Fig 1

The source of etiological agents are contaminated food and water. The etiological agents are viruses, Bacteriae, Fungi parasites and others. Among the Bacteriae the most common are shigella, salmonella, staphylococci, Cholera, enteropathogenic E. coli and chostridia. The parasites are Amoeba histolytica, Giardia, Trichuris and strongloids. Other condition are Tropical Sprue, Weanling diarrhoea, lactose deficiency and malabsorption states.

THE RESULTS OF FLUID AND ELECTROLYTE LOSS

Apart from diarrhoea and vomiting Potassium is also lost from the kidney and water also from the skin. Hypokalaemia is usually not seen in the serum but beings to occur during rapid rehydration. This results in cardiac arrhythmiae, muscular weakness and most commonly paralytic ileus-distension of abdomen in severe diarrhoea.

The saline depletion results in most of the signs of severe diarrhoea. This dehydration can be classified as 1°, 2° or 3° or as Mild, Moderate and Severe Stages. (REFER TO THE ATTACHED PRINTED FROM)

Metabolic acidosis occurs due to loss of bicarbonate in stool. This results in first respiratory compensation and then impaired cardiac function leading to CCF during rapid rehydration, if acidosis is not simultaneously corrected.

Among other complications the increased Katabolic processes in the body during

illness causes increase breakdown of proteins and this supplemented with dietetic restriction results in severe weight loss and malnutrition. Tetany, hypoglycaemia and seizures may also occur.

Fluid and electrolyte content of small Intestine (in mEq/l)

	Na	K	Cl	HCO ₃
Normal small Intestine Illum	135-140	5-10	100-120	10-25
Jajunum	135-140	5-10	90-110	25-35
Acute paediatric diseases Cholera	105	26	95	31
Infantile diarrhoea	56	35	55	14
Actual deficits at the time of admission Cholera	11.5	6.5	9.5	106
Infantile diarrhoea	9.5	10.4	9.2	125

Fig. 2- consolidated from Dr: Saeks lecture series

USUAL MANAGEMENT IN OUR COUNTRY

Diarrhoea and vomiting are treated in this country mainly by 5% Glucose with or without normal saline by I.V. route, Normal Saline with hyalase given subcutaneously to infants, and oral drugs like Sulfathiazole, Sulfaguanidine, Bismuth, Pectin, Kaolin, Enzymes, Chloramphenicol plus Streptomycin preparations and newer antibiotics if available. "Nothing by mouth until diarrhoea controls", "Bowel rest" and 'Barley water' for a long period are the conventional supplement for therapy. The necessary attention is not paid to the proper replacement of lost electrolytes.

These are very expensive and unnecessary wastage of valuable resources. Further, the diarrhoea - malnutrition - infection cycle which is being created artificially is another potent cause of death in children. In our country almost 40% of the population is that of children and no matter how much we try conventionally, it is impossible to hospitalise and treat these cases by I.V. fluid and sophisticated guidance of serum electrolyte levels, stool culture etc. It will be more rational to presume the presence of hypokalemia and metabolic acidosis in all cases of acute diarrhoeal disease and start with adequate replacement of sodium, potassium and bicarbonate along with water to prevent coma and death.

Hence it is time that we choose a new approach to this problem - a technique which is very simple and effective, needs least trained manpower; is very cheap and can be easily available throughout the country. This is the concept of "Rehydration Therapy Centre" where stress is laid on "Oral fluid therapy" to match the fluid loss in diarrhoea or "ad lib" therapy until the refusal to drink.

REHYDRATION THERAPY CENTRE OF NARAYANI ZONAL HOSPITAL

The Rehydration Therapy Centre at Birgunj Hospital, the first centre of its kind in the country was started last year during summer, when the prevalence of diarrhoea disease greatly increases in our country. This is a two room centre with two beds available throughout the year for admitting severe diarrhoea cases. It can accommodate with difficulty upto 40 beds if necessary. This centre is under the Senior Paediatrician, while the sister incharge of the hospital is responsible for training and supervising the nursing aspect. The paramedical staffs are AHW & ANM and any body else who is willing to work including the ward orderlies etc. The only training that is required for those people is to be able to measure the fluid loss and coax the guardian of the patient to feed the patient with the fluid supplied.

The list of other requirements are:-

- (a) **Equipments** - Weighing scales, Beds ("Cholera cots") (made from discarded old cots with a central hole freely available in our hospitals) and plastic sheets, calibrated buckets and cups, Arm boards, Measuring spoons, Feeding Cups, stethoscope, I.V. Stands, Urinals, Almirah, sphygmomanometer (optional), stretcher, big jars.
- (b) **Supplies**- I. V. giving sets, Scalp vein needles, Cut down Sets, syringes and needles, Thermometers, Nasogastric tubes.
- (c) **Fluids, Chemicals and antibacterials**-Ringer Lactate, Flexflac (limited supply) RD-Sol packets for making oral solution, supplies of sodium chloride, sodium bicarbonate, potassium chloride and Glucose for making Birgunj solution, Tetracycline-syrup and capsule (for limited use), FURAZOLIDONE syrup and tablets. Disinfectants.

CHOLERA COT

The Birgunj solution is prepared in Pharmacy and is supplied to poor patient who cannot afford to buy RD-Sol packets. The doctor in the OPD explains that the patient should be drinking the solution as much as he feels thirsty ('ad lib') to cater for diarrhoea. Only moderate to severe cases are admitted in Rehydration Therapy Centre. Severe cases who are in shock or in a state of stupor are given I.V. Fluids until they return to full consciousness and

moderate stage dehydration. When the therapy is switched over to oral fluid only by mouth or via nasogastric tube. A child in profound shock and dehydration as shown by absent radial pulse, poor skin turgor, lack of response etc. represents a medical emergency and an all out attempt is made to start I.V. fluids by placing the needle in the usual site, if necessary in the unconventional sites too by several doctors (when available) at once. Mild cases are sent home with either the prescription of RD-Sol or supply of hospital pharmacy prepared Solution (BIRGUNJ SOLUTION). The only drugs that are used are Furazolidone and occasionally Tetracycline and Ampicillin. The steroids etc. are never used neither the previously mentioned other drugs.

EXPERIENCE WITH 100 DIARRHOEA CASES

100 patients ranging from 2 days after birth to 14 years were admitted in the Rehydration Therapy Centre during 3 months of summer of 1974. On admission a detailed history and other observations were recorded in a specially prepared form which is attached here. Special emphasis was given to **nutritional status** and **degree of dehydration**. Associated Systemic infections were also noted. Immediately, following admission the moderately dehydrated cases were started on 'Ad-lib' Birgunj solution or RD Solution. Cases bordering to severe dehydration or already severely dehydrated cases were immediately given I.V. infusion along with simultaneous feeding of oral poly electrolyte solution by mouth or by a nasogastric tube. Depending upon the state of the peripheral veins all available sites e.g. Scalp Vein, External Jugular Vein, Femoral Vein were utilized for immediate infusion of I.V. Solution. A wide variety of I.V. Solution including Flexflac was used depending upon availability. The amount of fluid given was calculated according to the degree of dehydration and weight on admission. For example if the child's weight is 10 kg., 1 litre of I.V. Saline was injected at a speed of 20-30 ml. 1 kg. over first hour. The remaining calculated deficit was given over the next 8 - 12 hours. Roughly 250-500 ml/hour in severely dehydrated child during the first 12-24 hours. Just after saline infusion oral therapy was also started. The quantity of replacement fluid was increased in proportion to match the concurrent losses by way of stools, urine and vomiting. Severe cases returning to moderate levels with obvious improvement were then continued only with the oral solution, I.V. infusion being stopped. No drugs were used to control vomiting, and oral feeding was not stopped due to vomiting. The amount of fluid lost in vomiting was replaced with equal amount of oral solution. Vomiting was stopped in a few hours. However care was taken to prevent aspiration of vomitus. Stool examination was not

done routinely except in a few of find the invasive etiological agent, by direct microscopic examination of stool. Stool culture was not done as we do not have the facility in our zonal hospital and so also the electrolyte estimation which we do think is necessary too. Antidiarrhoeal agents that were used in all cases was FURAZOLIDONE (Furoxone) except in two cases where oxytetracycline and 3 cases where ampicillin was used—which were thought to be invasive type of Bacillary Dysentery.

Table: ORAL Solution available for use

Solution	Na ⁺ (mEq/L)	K ⁺ (mEq/L)	Cl ⁻ (mEq/L)	HCO ₃ ⁻ (mEq/L)	Glucose (mM/L)	made with (per litre)			
WHO COURSE	90	20	80	30	150	3.5g	2.5g	1.5g	25.0g
°DACCA SOLU-								°°°	
TION	120	25	97	48	110	4.2g	2.0g	2.7g	20.0g
GE-SOL	81	18	71	28	139	°°	½	¼	2
						½			
						tsp	tsp	tsp	table spoon
RD-SOL	95.60	17.43	77.33	35.75		3.5g	3.0g	1.3g	25g
BIRGUNJ SOLUTION						1	½	½	3
						tsp	tsp	tsp	table
									spoon+
									Tr. Card

°designed for cholera patients

°°standard measurements for United States

°°°as Potassium citrate rather than KCL

Table: Summary Observation of all 100 cases

Age group	total	Nutritional Status Dehydration						cured	expired	lama
(in years)	100	OBE	NOR	THI	MAL	Moderate	Severe			
0-1	52	X	6	40	6	31	21	31	18	3
1-5	32	X	8	20	4	28	4	28	3	1
6-10	10	1	2	6	1	7	3	10	X	X
10+	6	X	2	4	X	2	4	6	X	X

Total number of cases with diarrhoea + systemic Infection	--	6
with " + hypokalemia	--	2
?hypoglycemia	—	1

17 out of 21 cases died within 24 hours of admission. This is a very significant observation because it shows that these cases were severely dehydrated at the time of admission due to lack of facility for enough scal vein set and visible peripheral veins some cases could not be infused with I.V. fluid immediately.

Table: Sex-Age distribution (100 cases)

<i>Male</i>	Female	Total	Age group
30	22	52	0 - 1
20	12	32	2 - 5
5	5	10	6 - 10
4	2	6	11+

This table shows that more attention is paid to the male children similar observation was reported earlier too.¹⁸

Table: duration of hospitalization

Duration	Age group				Total
	0 - 1	2 - 5	6 - 10	11+	
less than 24 hrs.	16	3	2	5	26
24-48 hrs.	23		4	1	44
48-72 hrs.	13	11	4	—	28
72 hrs.-4 days	—	1	—	—	1
4 days +	—	1	—	—	1
Total	52	32	10	6	100

less than 48 hours 70% including death, more than 48 hours 30%

This table shows that almost half the cases need to stay in the therapy centre for about two days. One quarter leave (either die) before 24 hours and remaining cases might take upto 4 days. These last are the cases which might have concurrent infections or other complications.

Our sample of 100 cases is rather a small number to be very emphatic on specific points but it none the less points towards the overall favourable impact of such a rehydration therapy centre.

DISCUSSION

The concept of oral electrolyte therapy was introduced by Darrow and his

associates as long ago as 1949⁵. The addition of glucose in the solution is found to increase the absorption of water and electrolytes, from the small intestines. Hirschhorn and associates⁷. Clearly have pointed out that the oral therapy of polyelectrolyte solution is suited to infants with acute diarrhoeal disease of diverse etiology. Love,⁸ Nalin,⁹, Pierce¹⁰ and others have clearly shown that sodium, potassium and bicarbonate given orally in a glucose containing solution are well absorbed even during diarrhoea. The report of studies of Bangladeshi refugees in India during 1973 and that of Indonesia¹¹ and Wr Sack¹² in his series of lectures on diarrhoeal diseases and management recommend the above mentioned therapy in diarrhoeal disease. David Morley in his book emphasises the need of nutrition in diarrhoea so as to minimise the diarrhoea-malnutrition-infection cycle. Our study also shows that the malnourished children are the biggest risk (Table).

One of the many questions that are raised in 'ad lib' and oral therapy is whether excessive rehydration might cause harm. This problem never occurred in our present and earlier¹³ studies. Even if such a thing might occur it is negligible for practical purposes.

Regarding the type of dehydration it is the Isotonic one which is the most common form (70-90% more than 90%). Hypertonic dehydration can be diagnosed with history and clinically detected by patients marked thirst, extreme dry mucous membrane or hyperirritability. Hypotonic dehydration is difficult to detect clinically however there may be moist mucous membrane and child may be in coma.

One of the biggest errors or difficulty is how to recognise the exact state of dehydration. In a fairly well nourished child this is not a problem. But the problem is enhanced if an already marasmic child or a severely under nourished child comes with dehydration. At such time the patient should be treated as having severe dehydration until obvious improvement comes.

The routine administration of FURAZOLIDONE is to be on the safe side:) experience is the supply of watery Birgunj solution does not satisfy the parents. To distinguish from water and other solutions and also for flavour and colour we add Tr. Card. Co. as perera has recommended¹⁴.

Rehydration Therapy Centres have been opened in many South American Countries as long as 12 years ago. Many other countries all over the world are also trying to cope up with the gigantic problem of diarrhoeal disease by establishing such centres in their respective countries in maximum number.

CONCLUSION

The oral therapy for dehydration is a very effective safe cheap and readily available

method for controlling the alarming no. of death in the children, as well as in adults. It needs very little training, a good program of Health Education. It does not need any new physical facility. Every Health Post or Panchayat can have rehydration therapy centre and most cases of diarrhoeas and vomiting can be controlled at the mild level. This concept has not been included in the medical text books and hence fresh medical graduates should be oriented in this technique – not only the AHW and ANMs and nurses. Major organisations like WHO and UNICEF should conduct courses on Rehydration Therapy Centre in Nepal. The concerned authority should make more and more RD-Sol packets available in country and restrict the wastage in sulfaguanadine etc. Every hospital and health posts should start keeping this 'holy water' in big jars and supply the poor patients with diarrhoeal disease free of cost.

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