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Training of Paramedical Personnel.
Understanding priorities in treatment of diarrhea *

by

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There are many causes of diarrhea, most are difficult to diagnose with certainty and specific treatment is illusory; prevention is a difficult long range goal in social/economic/ and health planning.

There is only one major cause of death from diarrhea -dehydration; it is relatively easy to diagnose and treat, even easier to prevent.

Training of medical personnel must emphasize the importance of dehydration, its diagnosis, recognition, prevention and treatment. Maintenance of body hydration is the key to therapy for cholera, amoebiasis, toxin producing *E. coli*, measles, lactose intolerance, acute food poisoning, dengue hemorrhagic fever, viral enteritis, heat stroke; the list is almost endless. Management is basically the same for all:

1. All loss of fluid should be replaced.
2. A thirsty child should be offered sufficient fluid to satisfy his thirst. He should be encour-

aged to continue drinking small frequent amounts of glucose containing electrolyte fluid, or water with salt and sugar.

3. A well-hydrated child should have palpable pulses in wrists and feet.
4. A properly hydrated child will pass urine every 2-4 hours.

How do we convince the vast numbers of medical workers of this nation of the truth and validity of these guidelines? It is they who are close to the people, they who can spearhead the drive to change traditional attitudes of villagers. Most medical workers are indeed villagers themselves, who speak the same dialect, who grew up with the same prohibitions and beliefs. It is they, if they become converts to the understanding of fluid therapy, who can successfully carry this message to the people.

As in most areas of health education, experience is not only the best

* Presented at the Seminar on Rehydration, Jakarta, 26 - 29 August, 1974.

Received 7 Sept. 1974.

teacher, it is the only teacher. I like to start by mixing a liter of glucose electrolyte fluid for my students, or better still, provide them with a liter jug, a spoon and the raw materials. Emphasize level spoonfuls-as if full of water, no more. Then simply mix 8 spoons of glucose (20 gm), one spoon of salt (4 gm), three quarters of a spoon of baking soda (3 gm NaHCO_3). I fill the spoon and scrape off $\frac{1}{4}$ its contents from the tip, and finally add $\frac{1}{4}$ spoon of KCl or K citrate. Add one liter of water, or if for a child I add $1\frac{1}{2}$ liter to make it a bit more hypotonic, pointing out that little ones need more water, and then stir. Now, we all try to drink a bit, just for taste.

Next you must have a patient. There is no sense expecting someone to believe you, you must demonstrate and be able to show results. A dehydrated child is examined with particular attention to pulse rate, respiration, and duration since last passage of urine. He should be weighed carefully and notice taken of the less quantifiable signs of dehydration - skin turgor, degree of mouth dryness, hoarseness, sunken eyes or fontanelle. All this is carefully recorded and the child is offered the freshly made glucose-electrolyte solution (GESol). Sometimes he must be coaxed or fed with a spoon, it is always best to have the mother do the feeding, but insist that the child be offered GESol in sips or small amounts continuously. When you are sure the

child is drinking, leave the mother and child in the waiting area of the clinic to continue on their own. If the child initially refuses, or seems a bit sluggish, push a rubber or plastic tube through the nostril and down into the stomach and, over one hour or so, pour in GESol equal to 5-7% of the child's body weight. He will usually agree to drink after that.

Measure all the fluid the child drinks and all that comes out, either in stool or urine or vomitus. Even if a child vomits it can be quickly seen that the quantity vomited is far less than the total drunk. When the child passes a normal stream of urine (I don't mean a few drops) it is time to re-evaluate him. By now he has probably drunk about 10% of his body weight and 2-3 hours have passed. Repeat all the measurements you recorded initially. Pulse should be slower and feel stronger, respiration is less deep and the body weight will be increased by the amount of fluid drunk, minus any losses in stool, urine or vomit. Generally everyone feels happy about the improvement, especially the child's mother who tends to tell other people about such results.

The mother then is given a packet of salts and glucose freshly prepared (it can be wrapped in newspaper or banana leaf) and told to mix it in $1\frac{1}{2}$ liter of boiled water at home (7 glasses). Every time the child passes a diarrheal stool he is to be given another glass, in between if he is

thirsty he can drink as much GESol as he likes, any extra input will only show up as extra urine.

It is impossible to overhydrate with oral GE solution. The most common error is not giving enough. Give at least 10% of body weight for a starter, if there are no scales remember that a normal six-month-old weighs 7 Kg, one-year-old 9-10 Kg, two-years-old 12 Kg, thus they receive 700, 1000, and 1200 cc respectively as an estimate. The kidney is the best censor of hydration, its whole role in life is to throw out extra fluid and salts; thus we exploit this sensitive function using urine output as a measure of adequate hydration: "I've had enough". Then we just need to keep up with losses. We must urge mothers to return the following day if diarrhea continues.

"What happens", they always ask quite wisely, "when they come back tomorrow still having diarrhea?" It is extremely important to urge the health worker to keep a record of diarrhea cases sent home with fluid, surely some will return and appear to be "treatment failures". But the great majority will find that indeed within a day the diarrhea becomes much less and stops before two days have passed. Without some record the worker may tend to forget all these successes and become discouraged with those few who return still having diarrhea.

Firstly-is their state of hydration good? It should be if they've followed directions and continued to drink. If dehydrated in spite of trying oral fluids they should be referred on to a center equipped to give intravenous infusions. The others need to receive further GESol and compliments on having continued the important therapy as directed. If stools are becoming more seldom I usually send them home again, virtually certain that diarrhea will end within the next day. The others, I evaluate further for underlying causes of diarrhea, this indeed I do on the first day seen, after hydration is restored. How do we approach the cause of diarrhea?

Again we return to the idea of simple guidelines, formulated to hold true for the vast majority of cases, say 95 out of 100, fully realizing that exceptions may exist:

1. 70 - 90% of all diarrheal episodes are brief and self limited requiring only fluid replacement for 24 - 48 hours before they stop automatically.

These are due to viruses, to the ingestion of non-pathogenic bacteria that live for a short while in the upper gut causing diarrhea for a short time before normal mechanisms move them down to the colon where they do no harm, to eating large quantities of fruit or other unusual foods, and to other undefined causes.

Recently 100 children admitted to Rumah Sakit UGM in Yogyakarta were treated with fluids only, no antibiotics, all recovered quickly and completely. If they had been given medicine, it would have appeared to work well, this is why so many different approaches to diarrheal therapy seem to give rapid results, in most cases the disease is brief and self limited. These children do not have fever, fever is a sign of systemic infection and we must look for other causes. It is said that dehydration causes fever but this is a very unproven doctrine that rests on little or no evidence. Our experience in Dacca with over 10,000 children with cholera, clearly the worst kind of dehydration, yielded no evidence of fever. Any patients with fever were found to have also other infections.

2. Fever is an important sign of infection. A diarrhea patient with fever over 38.5° probably has a significant infection. Malaria may cause diarrhea. Measles, a severe inflammation of all mucus membranes of the body often causes diarrhea. Purulent tonsillitis, and especially acute otitis media, often before any perforation of the tympanic membrane occurs, may cause diarrhea. Intestinal invasion by shigella or pathogenic E-coli often causes high fever. These possibilities should be investigated with examination of a blood smear, an otologic examination and a fresh smear of feces examined for

presence of pus cells - a sure sign of bacterial diarrhea. Where these tests cannot be done a wise choice of therapy can be made: tetracycline or triple sulfa are good agents for treatment of tonsillitis, otitis media and dysentery all at once. Sulfaguanidine and streptomycin are not particularly useful for any of these conditions. In areas endemic for malaria blind treatment of fever cases with chloroquine is a reasonable alternative.

The possibility of amoebic dysentery is often raised. In the absence of microscopic stool examination the only way I know of making a diagnosis is by exclusion, treat the other possible causes first, if dysentery continues after five days of adequate therapy for bacterial dysentery then amoebae is a good guess. No one dies from amoebic dysentery in five days if hydration is maintained. If amoeba is indeed the cause, the usual dose of enterovioform for 3-5 days is of no value anyway, it must be continued for 10-14 days to be effective. When I'm told a patient with amoebic diarrhea was cured within 2-3 days of vioform I'm certain the diagnosis was incorrect to begin with, the patient probably had simple self-limited diarrhea.

3. Finally we must never forget the close association between malnutrition and diarrhea, the ruthless endless cycle ending in death. This is not the place for an extensive discussion of nutritional treatment but

we can remember several key guidelines:

1. The breast-fed baby has 5-8 times less episodes of diarrhea than the bottle-fed child. Breast milk is never the cause of diarrhea.
2. The vicious cycle can only be broken with the provision of a good diet, high in protein and calories. For a malnourished child suffering from diarrhea to be deprived of food for even one day is hastening his death.
3. The role of lactose in causing diarrhea tends to be overemphasized although lactose deficiency clearly occurs in many cases. Rarely do village children have the chance to drink enough milk to make a significant lactose load. If skim milk is available, the powder can be mixed with other foods, such as rice, to enrich the protein content.
4. Fats, especially coconut oil are an extremely rich calorie source - in small amounts they are readily absorbed, even by the damaged intestine and provide the needed calories for recovery. Prohibition of coconut oil in the diet of a malnourished child with diarrhea may deprive him of the only possible source of enough calories to break the vicious circle.

If these concepts about the underlying causes of diarrhea are not

believed by paramedics, a reasonable feeling I should expect - given the long tradition of extensive drug treatment for diarrhea, then persuade the worker to run a small trial himself. Simply divide his diarrhea patients into two groups as they come to the clinic - one can be treated by long accepted methods, the other using the guidelines given in this paper. Evaluation of duration of diarrhea, extent of weight loss and time to full recovery will provide an adequate demonstration of the best method.

When the worker accumulates his own data, his own experience, then he too will become a strong proponent of a physiologic approach to the treatment of diarrheal disease through rehydration, feeding and a critical analysis of drug therapy.

In summary, the training of paramedical personnel hinges on the clear understanding of priorities and the chance to experience first hand the effectiveness of therapy. Prevention and treatment of dehydration is simple and results are easily demonstrated. The proof lies in the experience.

Although most diarrhea is self limited, those cases with fever require extra attention beyond fluid replacement. Simple priority guidelines are useful and will help the paramedic see the fallacy of some of the long honored but relatively useless therapeutic practices.

The interlocking relationship of diarrhea and malnutrition must not be forgotten in even the simplest cases. As for all disease processes

known, adequate food is still the most basic and important medicine for every human being.

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