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A STANDARDIZED PLAN OF TREATMENT FOR GASTRO-ENTERITIS IN INFANTS

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Following an outbreak of infantile diarrhoea and vomiting at a base hospital shortly after the onset of war, with the very high mortality rate of 80%, certain strict prophylactic measures were taken and a schedule of treatment formulated; these have resulted in a fall of the death rate to 23% and no recurrence of the disease in epidemic form. We therefore consider it worth while to record our routine procedure as a suitable standard of treatment for use in hospital and to report certain interesting signs of prognostic value and measures taken for prevention of this disease developing in hospital.

Treatment

Chart I shows the schedule of treatment practised in our infantile gastro-enteritis wards.

CHART I.—Treatment of Gastro-enteritis

The following is an outline of the treatment to be given in every case of diarrhoea and vomiting. Details must be adjusted to suit individual cases.

The Moment to Start.—As soon as there is any suspicion that the disorder is more than a dietetic upset. The following points may help in this distinction:

- The Stools.**—Frequent, watery, offensive, or much mucus.
- The Vomits.**—Exclude overfeeding, possetting, wind, etc.
- A rise of temperature.**
- Baby looks ill.**

1. **Give Castor Oil.**—Under 1 year, 1 drachm; over 1 year, 2 drachms.
2. **Stop all Milk,** and give 2- to 3-hourly by mouth half-strength Hartmann's Ringer-lactate solution. Add a little saccharin if necessary.

3. **The Daily Total Fluid Intake** should aim at 2½ oz. per lb. body weight, plus extra for dehydration not exceeding 10 oz. Slight dehydration may be restored by subcutaneous saline given early.

4. **If Dehydration Marked,** put on **Intravenous Drip** of half-strength Hartmann's solution containing 5% glucose for 24 hours, with only sips of water by mouth:

5 lb.	..	15 c.cm. (1/2 oz.) per hour =	360 c.cm. in 24 hours
7 lb.	..	20 c.cm. (2/3 ") " " =	480 c.cm. " "
10 lb.	..	30 c.cm. (1 ") " " =	720 c.cm. " "
15 lb. or over	..	45 c.cm. (1½ ") " " =	1,080 c.cm. " "

After 24 hours, feeds should be introduced according to the "pyloric schedule" (Note 6, second method). The drip must be slowed, provided dehydration is corrected, but must deliver enough to make up the day's total to the required amount. As the feeds increase so the drip is reduced. It should be the aim of treatment to make the baby independent of the drip by the end of the third day.

5. **Choice of Milk Feed.**—(1) Breast milk, if obtainable. (2) Half-cream dried milk, with or without lactic acid (e.g., half-cream lactic acid, Cow & Gate). (3) Boiled milk with or without lactic acid (babies over 6 months dislike lactic acid milk). (4) Unsweetened condensed milk.

6. Method of Introducing Milk Feed:

First Method (when on Hartmann's solution by mouth).—After 24 hours continue the feeds, replacing part of the Hartmann's solution by the milk chosen. as follows:

1 part milk*	to 8 parts Hartmann's for 12 hours
2 parts "	" " " " " "
4 " "	" " " " " "
5 " "	" " " " " "

and so on until correct strength for age is reached. Sugar should be gradually introduced when a half-strength milk mixture is reached. (N.B.—Mix the Hartmann's solution and milk immediately before the feed.)

* When dried or condensed milk is used this should be reconstituted to whole milk before adding the requisite "part" to the Hartmann's solution.

Second Method.—A "pyloric" schedule of feeding, to be used when changing from intravenous drip to bottle feeds. Choose one of the milk feeds as in Note 5 and dilute as described in Note 6. Give:

1 drachm hourly,	3 feeds	} 12 hours (total 3½ oz.)
2 drachms "	3 "	
3 " "	3 "	
4 " "	3 "	
6 drachms 1½-hourly,	4 "	} 12 hours (total 6 oz.)
1 oz. 2 " "	3 "	
1½ oz. 2-hourly,	6 "	} 24 hours (total 21 oz.)
2 " 2 " "	6 "	
2½ " 3 " "	6 "	
3 " 3 " "	6 "	

It may be necessary to go more slowly than this and even to alternate milk feeds with Hartmann's solution. With large babies the quantities may be doubled. Babies should have absolute rest, if possible, from midnight to 6 a.m.

7. **A Stomach Wash-out** given early in the treatment and occasionally repeated, but not more than once a day, is often effective in checking the vomiting.
A **Rectal Wash-out** given early in the treatment is effective when stools are particularly offensive with much mucus.

8. **Drugs.**—For collapse: nikethamide (coramine) 0.5 c.cm. intramuscularly every 2 hours up to six injections.

9. **Fresh Air.**—An overheated room lacking ventilation increases a baby's disposition to vomiting and diarrhoea. Warmth by hot-water bottles may be necessary, but open-air ventilation can be used with advantage.

10. **Special Note.**—There is a tendency to overtreat these babies. They collapse very easily. All medical and nursing procedures should be reduced to a minimum.

The Selection of a Suitable Fluid.—Most authors agree to a period of starvation before a milk feed is introduced, but opinions differ as to the most suitable fluid to give during this period by mouth or parenterally. The first function of such a fluid must be to re-establish or improve the excretion of the kidney, as this is the chief mechanism controlling the salt and water metabolism of the infant. Secondly, the substances contained in the fluid should approximate as closely as possible to those of plasma, and be in sufficient quantity to replace that lost by stool and vomit, acting as a good buffer counteracting the tendency to acidosis or alkalosis in these infants. Hartmann (1928) and Hartmann and Elman (1929) composed a fluid with these properties known as Hartmann's Ringer-lactate solution.

Liquor Ringer-Lactatis (Hartmann's Solution) (Supplement to B.P.C. 1934, Part III, Formulary 1941)

	Metric	Imperial
Lactic acid	2.4 ml.	23 m.
Solution of sodium hydroxide ..	A sufficient quantity to neutralize the lactic acid	
Sodium chloride	6.0 g.	52½ gr.
Potassium chloride	0.4 g.	3½ gr.
Calcium chloride	0.2 g.	1½ gr.
Distilled water to	1,000.0 ml.	20 fl. oz.

At a recent discussion at the Royal Society of Medicine Young (1942) showed that an infant is unable to concentrate solids in the urine to the same extent as an adult. Therefore in dehydration these products accumulate in the body. Although Hartmann's solution is slightly hypotonic, to ensure a good excretory function of the kidney we recommend diluting the fluid by half and adding glucose up to 5% for intravenous or

subcutaneous use, but for oral administration we prefer to omit the glucose in view of the danger of intestinal fermentation accentuating the diarrhoea.

The blood chemistry following the use of various types of fluids has been extensively analysed, and great importance attached to the plasma chloride level, by many workers, with inconclusive results. Hoag and Marples (1931) recommend alternating normal saline and 10% glucose for intravenous use, but Cooper (1937) suggests the addition of calcium gluconate to saline to accelerate the movement of the fluid from circulation to tissue spaces. We, however, consider estimations of plasma chlorides under saline therapy of doubtful therapeutic value, as in several fatal cases the chloride percentage had regained a normal level.

Quantity of Fluid Required.—The total quantity of fluid given daily was kept constant at 2½ oz. per pound of body weight except in cases of dehydration, in which extra fluid up to 10 oz. a day was added according to the degree of dehydration. It is unwise to exceed this quantity owing to the danger of producing oedema.

The choice of milk for the feeds does not seem so important as the method of its introduction, which must be very gradual in all cases, however mild, especially in those with a tendency to vomit. In the latter the introduction may have to be even more gradual than we state in the schedule. Children over 6 months of age with persistent diarrhoea were treated with apple and tea diet (Sheldon and Hall, 1939) with some success, but the danger of this treatment is its tendency to produce vomiting, which in our experience is a more serious symptom.

Chart II is our daily record chart. It facilitates calculations of feeds and shows at a glance the weekly progress of the case. Records for a single day have been filled in.

CHART II.—Weekly D. and V. Treatment Chart

Name: J— D—		Age	3 months	Weight	10 lb.
Date	29/8/42				
Fluids lost:					
Stools ..	7				
Vomits ..	2 small				
Urine ..	N.A.D.				
Fluids given:					
Intravenous ..	15 oz.				
Subcutaneous ..	—				
By mouth ..	17½ oz.				
Day's total ..	32½ oz.				
Approx. fluid required ..	27½ oz. + 5 oz.				
Estimate of dehydration ..	Moderate				
General condition ..	Poor; restless				
Focal sepsis ..	0				
Operation ..	0				
Type of feed ..	Lactic acid milk + Hartmann's sol. 1 in 4, 2½ oz. 3-hourly—7 feeds				
Drugs	0				
Character of stool ..	Green, watery				
Other notes ..	Troublesome cough				

Intravenous Therapy.—Intravenous fluid was introduced through a Bateman needle (Allen & Hanburys) after cutting down on a vein. The internal saphenous or veins in the cubital fossa or on the back of the hand were the ones most commonly chosen. If the vacoliter to be used was not calibrated, this was done before starting the operation, by marking in 10-c.cm. units a length of adhesive strapping which if carefully adjusted can be transferred from one bottle to the next when they are changed. The rate of the drip varied according to the size of the dripper and the quantity of fluid required. Approximately 8 to 16 drops a minute will deliver 50 c.cm. in an hour. An accurate hourly record of the quantity of fluid given was kept

on a chart (Chart III). It is unnecessary to heat the fluid but important to keep the baby warm with hot-water bottles.

Blood Transfusion (10 to 15 c.cm. per pound of body weight) was useful in cases with severe anaemia or gross sepsis, or in the second or third week when the progress of the child

CHART III.—D. and V. Daily Fluid Chart

Name : J — D —					Weight : 10 lb.	Date : 29/8/42			
Time	Reading on Scale (c.cm.)	Amount in Hour (c.cm.)	Rate of Drip (Drops/Min.)	Total for To-day (Approx. in Oz.)	Remarks	Fluid by Mouth	Vomits	Stools	Urine
a.m.									
0	120				Restless				1 green, watery N.A.D.
1	138	18	7	$3\frac{3}{4}$					
2	152	14	5	$1\frac{1}{4}$					
3	172	20	8	$1\frac{1}{2}$	Lactic acid milk + Hartmann's sol. 1 in 4 →	2½ oz.	1 small	1 loose, yellow	N.A.D.
4	189	17	7	$2\frac{1}{2}$					
5	205	16	6	$2\frac{1}{2}$					
6	223	18	7	$3\frac{1}{2}$					
p.m.									
12	540	18	7	15	Lactic acid milk + Hartmann's sol. 2 in 3 →	2½ oz.		1 loose, yellow	N.A.D.
Totals						17½ oz.	2	7	

Total fluid for the day, 32 oz.

was unsatisfactory. Aldridge (1941) prefers plasma to blood for transfusions owing to the increased viscosity of the blood in these infants, but we consider blood of more therapeutic value provided dehydration is corrected first.

Relapses were of two types. (1) The infant who responded at first to treatment and then started to vomit again and had an increased number of watery stools. In the first relapse of this kind the full schedule of treatment was started again, omitting the castor oil, but in subsequent relapses the milk mixture was persisted with as far as possible by mouth and the remainder of the fluid requirement was given parenterally. (2) The second type occurred in infants who reached the convalescent stage with normal stools and then relapsed. This was fairly common, but the child appeared to gain a certain immunity to the disease, as there were no fatalities in second or third attacks. The full schedule of treatment was given for each relapse of this nature, usually starting with castor oil.

Drugs.—Several varieties of the sulphonamide group of drugs were given by mouth or intravenously for parenteral infections with unsatisfactory results. The importance of a good fluid excretion by the kidney during the administration of these drugs is well recognized, but in infantile gastro-enteritis, in spite of an adequate intake, this excretion is reduced to sub-normal by excess elimination from the bowels, less often by vomiting and from insensible perspiration of the lungs in a febrile child. Fifty-two babies were given a course of eucortone and six infants were tried on nicotinic acid, but no significant change was noted, so these drugs were discontinued.

Results

From Nov., 1940, to April, 1942, 100 infants under 2 years of age were treated for gastro-enteritis at the Hospital for Sick Children, Great Ormond Street, and its base hospital at Hemel Hempstead. Twenty-three of these died—a mortality of 23%. Realizing that the mortality depends to a large extent on the type and severity of the disease, we attempted to assess these by instituting a system of "marks" for certain symptoms and signs—the higher the number of marks scored the greater the severity of the disease and the more serious the prognosis. Chart IV shows our marking system.

It was soon found that this system had too many fallacies to be of statistical value. For example, personal variations cannot be excluded, and therefore certain estimates are only approximate; also, some features of the illness, such as diarrhoea and vomiting, may never fully develop. This particularly applies to the worst type of infantile gastro-enteritis showing practically no dehydration, vomiting, or diarrhoea, but merely

the toxic facies—a type in which the child may be dead in 24 hours. However, certain interesting facts of prognostic value evolved from our system; these seem worth recording.

CHART IV.—*An Index of Severity*

Features of the Illness	Scoring 2 Marks	Scoring 1 Mark	Scoring 0	Marks Scored
1. Weight of infant before onset of D. and V.	—	14% or more underweight	Less than 14% underweight or overweight	
2. Age	Under 6 months	6 months to 1 year	Over 1 year	
3. Where disease developed	—	In hospital	At home	
4. Duration of symptoms before treatment started	—	Over 3 days	0 to 2 days	
5. Appearance of infant (collapsed, toxic, shocked, ashen)	Severe	Moderate	Mild	
6. Dehydration ..	Present	Arising after onset	None	
7. Parenteral infection	at onset of disease	—	—	
8. Maximum number of stools in 7 consecutive days	More than 40	30 to 40	Less than 30	
9. Maximum number of vomits in 7 consecutive days. (More than 14 scores 4 marks.)	8 to 14	—	0 to 7	
10. Altered blood in vomit ("coffee-grounds")	Present	—	Absent	
Total ..				

Weight.—Cooper (1937) recognized the importance of the weight of the infant at the onset of the disease. In his series of 300 cases the mortality rose from 36.5% to 65.0% in those 30% or more underweight. Maitland-Jones (1933), however, considers the figure of 14% or more underweight for age as representing an atrophic infant, and this figure we chose as our criterion. Thirty children fell into this category and 12 died—a mortality of 40%.

Age.—In agreement with other authors we found the disease most lethal in the first six months of life.

Age of Child	No. of Cases	No. of Deaths	% Mortality
Birth to 6 months ..	65	17	26.2
6 months to 2 years ..	35	6	17.1

Where Disease Developed.—Of great significance was the high death rate in infants developing the disease in hospital as compared with those contracting it at home.

Disease Developed	No. of Cases	No. of Deaths	% Mortality
In hospital ..	46	15	32.6
At home ..	54	8	14.8

Length of Illness before Treatment Started.—The importance of starting treatment early has already been stressed. Our figures show that if treatment was begun within two days of onset of symptoms the mortality fell from 25.9% to 20%.

Treatment Started	No. of Cases	No. of Deaths	% Mortality
0-2 days ..	40	8	20
3-5 ..	30	8	26.7
Over 5 days ..	24	6	25.0

Dehydration.—In agreement with Campbell and Cunningham (1941) we found that the mortality was closely associated with the degree of dehydration, rising as the latter increased in severity.

Degree of Dehydration	No. of Cases	No. of Deaths	% Mortality
None ..	22	0	0
Slight ..	27	1	3.7
Moderate ..	17	3	17.6
Severe ..	34	19	55.9

Parenteral Infection, if present at the onset of the gastro-enteritis, carried with it a higher mortality, whereas infection developing after the onset was not of such serious prognostic significance.

Infection at Onset	No. of Cases	No. of Deaths	% Mortality
None detected ..	61	12	19.7
Present ..	38	11	28.9

Vomiting was an important symptom. More than 14 vomits in one week carried with it a high rate of mortality. "Coffee-ground" vomit containing altered blood was seen in 12 cases, only 2 of which recovered.

Maximum No. of Vomits in 7 Consecutive Days	No. of Cases	No. of Deaths	% Mortality
0 to 7 ..	59	4	6.8
7 to 14 ..	16	4	25.0
Over 14 ..	24	15	62.5

Diarrhoea.—We took a less pessimistic view of the frequent watery stool, finding it easy to control provided there was no vomiting. However, our figures suggest that if frequent stools persist longer than a week the prognosis is not so good.

Maximum No. of Stools in 7 Consecutive Days	No. of Cases	No. of Deaths	% Mortality
0 to 30 ..	37	6	19.4
30 to 40 ..	37	9	32.1
Over 40 ..	21	8	61.5

Discussion

The treatment of infantile diarrhoea and vomiting is too often unsatisfactory and haphazard. The mortality from this disease varies from 14 to 88%—seeming to depend to a large extent on the severity of the disease, which, as already shown, is difficult to assess scientifically. The toxicity rises in epidemics, when the mortality may reach 100%. Rice and his co-workers (1937) report 16 outbreaks in 11 lying-in institutions in America from 1934 to 1936: 505 cases were affected, with a fatality of 46%. The accompanying table shows results from the literature.

Table showing Cases and Mortality Rates in the Literature

Author	Institution	No. of Cases	% Mortality
Campbell and Cunningham (1941)	Park Hospital	574	27.7
Cooper (1937)	Royal Hospital for Sick Children, Glasgow	300	47.2
Recorded by Cohen <i>et al.</i> (1933)	Brooklyn, New York	175	35.0
Rice <i>et al.</i> (1937) ..	Eleven lying-in institutions in America	505	46.0
Smellie (1939)	Birmingham	500	48.0

The treatment varied so considerably from author to author that no correlation could be detected between any special method and the recovery rate. In view of this and the unsatisfactory mortality rate, particularly in those developing the disease in hospital, it is our opinion that prevention calls for far greater study, especially in hospitals and nurseries for infants.

Prevention

As a result of our first epidemic at the base hospital in 1940, when 12 out of 15 infants died, the following preventive measures were taken:

1. Better spacing of beds, interspersing baby-cots with those of older children. The number of children in a ward was reduced to half the number of adults the ward was designated to hold.
2. Masks and gowns were worn by all attending any baby under 2 years old.
3. An isolation ward for babies developing gastro-enteritis was obtained, and medical officers were encouraged to send the infants there on the slightest suspicion of the disease.
4. Ventilation was improved in order to keep a cool moving air in the wards, and nurses were encouraged to keep the infants warm with hot-water bottles rather than raise the temperature of the ward.

These measures were effective in reducing the incidence rate and preventing another epidemic; but they are far from ideal, and further recommendations are suggested.

5. Whenever possible, treat an infant in its own home unless the condition it suffers from demands admission to hospital. In hospitals the risk of infection is enormous unless the cubicle system, and nurses trained in prevention of infection, are available.

6. When admission is essential, babies under 2 years of age should be nursed in cubicles.

7. If a baby contracts gastro-enteritis it should be kept in its cubicle, and on discharge the latter should receive proper cleansing and preferably remain empty for a day or two.

8. After the war, nurseries for infants under 2 years of age should be discouraged. This would particularly apply to nurseries in maternity homes. To overcome this problem the ideal maternity home could be divided up into separate cubicles for mother and child. This seems a justifiable step to take when such figures as those quoted by Rice and his co-workers (1937) are considered.

9. If an outbreak develops in an institution, further admission for infants under 2 years old should temporarily cease, as many infants as possible be sent home, and the remainder be widely separated among older children or adults. Where one room alone has been used for the children this should be closed, thoroughly cleaned, and aired.

Summary

A plan of treatment for infantile diarrhoea and vomiting which has worked with encouraging results is put forward as a basis for use by those in charge of sick infants. One hundred infants were treated by this method, with a mortality of 23%. Certain interesting figures of prognostic value are recorded, including the high death rate of 32.6% in infants developing the disease in hospital compared with those developing it at home. In view of this and the recorded high mortality in institutional epidemics, measures for the prevention of the disease in hospital and nurseries are given.

Adequate treatment demands team-work and probably presents as highly skilled a form of nursing as any in diseases of children.

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MILITARY MEDICINE IN THE MIDDLE EAST

AN EXPERIENCE OF 13,542 CASES

BY

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This paper is based on the work of the medical division of a large hospital situated in a base area in the Egyptian desert, and covers a period of eighteen months (March, 1941, to Sept., 1942); the cases were unselected admissions from local camps and from convoys from the forward areas. It seemed to me that a brief survey of the medical problems out here might be of interest in England. This climate, while on the whole healthy, is unsuitable for those prone to certain diseases, which should be better known to those selecting troops for service here. We work with limited clerical and much-depleted medical staffs. The turnover of patients is very large, and elaborate statistical analyses are impracticable. From official and private records a good idea of the larger disease groups can be got, but the rare diseases have had to take their proper place against the utilitarian background of war and will only be touched upon here.

The relation between medical and surgical admissions has ebbed and flowed with the tide of battle, but there have been roughly three medical to two surgical admissions. The types of case dealt with will be considered in large groups, and conclusions will be given rather than the arguments supporting them. Some of the conclusions will be at variance with accepted tropical teaching, but the controversial opinions expressed upon dysentery will be discussed in a fuller paper when time permits.

The approximate incidence of the cases, expressed in percentages, is given in Table I.

TABLE I.—Percentage Distribution of Disease; 13,542 Cases

Tropical diseases	45%
Acute and chronic respiratory diseases	17%
Skin diseases (including scabies)	15%
Functional and organic nervous diseases	7%
Infectious diseases	5%
Chronic digestive disorders	4%
Chronic rheumatism—articular and non-articular	3%
Diseases of kidneys and bladder	1%
Circulatory diseases	0.7%

Tropical Diseases

The figures relating to the various tropical diseases are given in Table II.

TABLE II.—6,144 Cases of Tropical Disease

Dysentery group	4,178 (2 deaths)
Short-term fevers	1,153
Malaria	735 (1 death)
Avitaminoses	34
Relapsing fever	19
Bilharziasis	18
Kala-azar	5
Leprosy	1
Effects of heat	1 (1 death)

The Dysentery Group

Diarrhoea is the most important disease of the Middle East, and nearly one-third of medical admissions were due to it. Although it is probable that, apart from a few cases of food poisoning, the cause is the dysentery bacillus, cases are divided into two groups according to whether blood and mucus are visible in the stools or not. If they are, the condition is called "dysentery"; if absent, "acute catarrhal enteritis" or "Gippy tummy." The distinction is useful, as it makes a rapid assessment of severity easy, and is to be objected to only when different causes are postulated. The duration of stay in hospital of 600 cases of dysentery was 19.5 days, and of 600 cases of acute enteritis 11.5 days.

Laboratories are overburdened by the routine attempt to isolate the dysentery bacillus; success varies, and depends upon collaboration between the laboratory and the ward, which is seldom perfect. A strong plea could be made for limiting laboratory examinations to a search for *Entamoeba histolytica*; dysentery can be adequately managed with minimal laboratory help, as severe cases must be treated on clinical indications just as urgently as must diphtheria.

TABLE III.—Dysentery Group; 4,178 Cases

Amoebic dysentery, including hepatic amoebiasis	36, or 1%
Acute catarrhal enteritis	2,313, or 55%
Bacillary dysentery	1,829, or 44% (2 deaths)
(Of positive isolations, Flexner 70%, Shiga 19%, Sonne 6%, Schmitz 5%)	

Treatment.—The contribution which this war will make to dysentery will be an appraisal of the value of specific chemotherapy and probably the abandonment of the use of castor oil and salts. On my responsibility—it was then almost a crime—saline treatment was stopped in this hospital in the summer of 1941; I do not think the treatment is of value, and on theoretical grounds it has much to condemn and little to commend it. Our usual treatment is rest in bed, ample fluids, a bland diet, and morphine to relieve colic in a few cases; dysentery has not, on the whole, been severe, so that in only about 10% of cases is any further treatment necessary. In patients whose diarrhoea persists more than seven days and who show active inflammation on sigmoidoscopy, and in all severe cases, one of the sulphonamide group has been given. Sulphaguanidine has been available since April, 1941, and both sulphanilamide and sulphapyridine have been used more recently. The conclusions we have reached are that sulphanilamide in tablets is of limited value; sulphapyridine and sulphaguanidine seem to be of equal value, and as specific in dysentery as the former is in pneumonia. As sulphaguanidine does not upset the patient it is the drug of choice in both acute and chronic dysentery; in the few cases of non-specific ulcerative colitis treated there has been no improvement. While the use of Shiga serum in very severe cases is compulsory, I have treated a few with double doses of sulphaguanidine, and recovery has taken place in attacks which were likely to have proved fatal.

Results.—There have been two deaths—one from exhaustion when adequate supplies of sulphaguanidine were not available, and the other that of a patient who already had a pericolic abscess when he reached us from the Western Desert. One patient was invalided home after a very severe dysentery, as he developed ulcerative colitis; a second patient was invalided home to South Africa owing to impairment in his health—he had been a prisoner of war; three patients were temporarily re-graded for base duties for three months. The remaining patients made a complete recovery. I regard this as a creditable record in such a disease, and I think it must be attributed to the use of sulphaguanidine in all the severe and prolonged cases: chronicity with permanent ulceration was not allowed