

CHAPTER 4

CHOLERA

THE possibility of cholera was early realised as a menace to troops engaged in campaigns in the islands on the northward route to Japan. It was evident that by traffic to or from the endemic areas such as Celebes, Burma, Malaya, Indo-China, the Philippines and Japan the disease could be introduced. The Combined Advisory Committee in Tropical Medicine, Hygiene and Sanitation which was set up to give expert guidance to General MacArthur discussed the problem at its first meeting in March 1943. At that time the situation was not dangerous, but steps were taken to assure ample supplies of cholera vaccine, should general inoculation of troops be necessary. Early in 1944, however, the position had changed and the committee's intelligence section showed that cholera had advanced rapidly beyond its pre-war boundaries. During 1943 there were severe epidemics of the disease in Shanghai and Hong Kong, and from Formosa it had spread by sea routes to the Carolines, Singapore and Makassar in the Celebes, and later in this year was spreading widely through the Philippines.

The committee drew the attention of General Headquarters in the South-West Pacific Area, and of the Australian Government to the position. It was apparent, therefore, in 1944, that definite plans were necessary; these included inoculation of troops, provision of special supplies and equipment, especially for bacteriological diagnosis, provision of adequate quarantine facilities, and special training of medical staffs in the recognition and handling of the disease, and of troops in hygiene. The Australian Armed Services obtained supplies of cholera vaccine sufficient to inoculate men serving beyond Australia. The American forces were already being inoculated, had promulgated instructions and obtained all equipment necessary. In June 1944 the committee recommended that similar measures be taken by the Australian medical services, and urged that medical advance units entering new areas be alert to detect any suspicion of an outbreak of cholera. The Royal Australian Navy decided on inoculation of all men entering endemic areas, and arranged for two injections to be given to all personnel except those in category "X", with a further stimulating dose every six months, or when considered advisable by the medical officer. Such army and air force men were inoculated as were exposed to the risk of infection in endemic areas.

Comprehensive technical instructions had already been issued through the Australian Army Medical Services, and details of standard procedures were circulated by the Deputy Assistant Director of Hygiene of New Guinea Force. In these instructions it was pointed out that certain of the features of cholera carried special risk to military formations. Areas might be infected by members of enemy forces who were incubating cholera, actually ill of the disease or convalescing from it. In the last mentioned case carriers were a danger, as 10 per cent of convalescents were infective

for about two weeks and some for months. Troops might be obliged also to occupy endemic areas. Epidemics might spread by carriers along lines of communication, and cholera vibrios under favourable conditions might remain viable for weeks and infect food or water in the usual ways. Water-borne infection was a particular danger because of the explosive nature of outbreaks spread thereby. Emphasis was laid on the importance of regarding standards of hygiene in units or formations in the prevention of other less dangerous intestinal diseases as a measure of their potential protection against cholera. These standards depended on the degree of education of all ranks, and on the hygienic discipline enjoined by the commanding officers, on whom the responsibility really lay. One weak link in the chain of water sterilisation was pointed out in New Guinea Force, the practice of chlorinating only water designed for drinking purposes, whereas unboiled or unchlorinated water was often used in the preparation of food, for cleaning the teeth, or for rinsing mess gear. Partial chlorination had been taught in some army hygiene schools, but with the risk of cholera looming such teaching called for revision. As a result the education of personnel in medical field units was undertaken so that bacteriological diagnosis might be made as early as possible, and cholera teams formed to deal with cases. A summary of necessary laboratory procedures was circulated for information. Fortunately epidemic cholera never became a problem in Australian forces in the Pacific area, but the preparations made were a necessary precaution.

Full instructions for treatment were also circulated. These depended for their efficacy on the carrying out of the procedures designed to make good the dangerous and often lethal losses of body fluid. It is interesting in passing to note that the serious degree of dehydration in cholera and the measures necessary to combat it were described by O'Shaughnessy in 1831. He remarked on the great loss from the blood plasma of water, salt and free alkali, owing to their passage through the bowel, and recommended the restoration of salt and water by enemata or intravenous infusion.¹ In all Australian medical holding units these measures could be carried out. The criteria were blood pressure and specific gravity of the blood, the latter being readily measured by the copper sulphate method, which was a standard procedure. A specific gravity of 1,063 or a systolic blood pressure of 70 mm. of mercury was taken as an urgent indication for parenteral fluid, one litre every four hours, or more if required. A blood pressure of 100-110 was aimed at and a specific gravity of the blood of less than 1,062. Rogers's method of the use of hypertonic saline and the administration of four times molar sodium lactate for threatened renal failure were described and advised. An interesting point was raised touching anti-cholera propaganda, whether such preparations and precautions would increase fear and perhaps lower morale. There is no evidence that it did so in any way, in fact the effect on hygiene was good. As early as 1942, when the 7th Australian Division was in action on the Owen Stanley

¹ I am indebted to Dr Robert F. Loeb for this reference, embodied in a communication made from the clinic of Dr Dana W. Atchley and himself in the Presbyterian Hospital, New York.

Ranges, efforts were made to make all ranks conscious of the risks of untreated water. Warnings of cholera were issued at this time; the effect of this publicity was to make the men more careful, but never did it cause alarm.

Though no emergency due to cholera occurred in 1944 or 1945, study of the ominous spread of the disease from various focal points, and of its extension to zones not usually included in endemic areas showed how epidemics might have flourished in the rapid movements of modern warfare.

The risks of cholera had already been recognised by British and Australian medical services in Malaya during the initial period of preparation and training there. After the capitulation of the forces the danger became reality. On 28th June 1942 a combined administrative instruction was promulgated from the headquarters in Malaya. This warned that the Japanese Army had reported the occurrence of cholera in Singapore, and called for strict observance of precautionary measures. These included the usual precautions concerning water, fruit and vegetables, cooking and eating utensils, control of all men with symptoms of diarrhoea, anti-fly measures and inoculation with cholera vaccine.

In the working camps cholera appeared and caused great loss of life. The conditions prevailing, especially at the approach of and during the damp monsoon season, were only too favourable for cholera, which was introduced by Asiatic coolies into numbers of areas. Little could be done to prevent its spread except with the concurrence and help of the Japanese, whose attitude was inconsistent in the extreme. Coolies lay dying or dead of cholera in close proximity to the insanitary quarters of the European prisoners of war. Great difficulty was experienced by our men in restoring or maintaining reasonable hygiene in the absence of material or labour, especially as all available men, whether ill or not, were absorbed in railway construction and similar work. Though the Japanese were afraid of cholera and had mobile cholera laboratories equipped for diagnosis, they sometimes refused to admit its existence in an area in spite of obvious evidence. Permission was also refused to dig adequate latrines until an epidemic had actually started. Mass bacteriological examinations were conducted on numbers of occasions, cultures being made from a glass rod introduced into the rectum. Vaccines were supplied, but the period of immunity was thought to be short; one Japanese medical laboratory officer placed the period as low as four weeks. This estimate is unduly low for an effective vaccine. Major Bruce Hunt, after extensive experience, considered that an appreciable degree of immunity began some ten days after the first dose, and two weeks after the second dose given a week later, immunity was almost complete and remained so for about three months. After this it slowly waned, and troops then exposed to infection were subjected to risk thereafter. Check smears were made on convalescent patients, the ideal standard of cure being three negative tests, but these were done in a very irregular fashion. Though inoculations were frequently carried out, uninoculated men were with great inconsistency introduced into highly

infected areas. Infection of food and water was almost inevitable in such circumstances, notwithstanding prohibitions by the Japanese of bathing in or drinking river water. On some occasions a five day cycle was observed between peaks of infection, and second waves of the disease sometimes arose in camps to which apparently "fit" men had been allowed to return. In some camps severe outbreaks took place with many deaths. Major Hunt has pointed out that in spite of the inconsistencies and neglect of the Japanese in matters of hygiene, their soldiers were trained to keep their mess gear scrupulously clean, to immerse it in boiling water before use, to drink only boiled water and not to eat with their fingers. The Australian soldiers tended rather to regard hygiene as chiefly the responsibility of hygiene squads, and greater personal responsibility in their training would have been advantageous in conditions prevailing in Burma and Thailand. Isolation quarters for cholera in this camp, as in others, were sited in marshy jungle, and only half protected from the rain, which poured through leaky huts and tents on sodden improvised beds. In the absence of blankets or groundsheets bamboo platforms were all that could be improvised, and as lights were almost non-existent, the chaotic and primitive conditions of the only nursing possible, particularly at night, can hardly be imagined.

As is usual in cholera epidemics the onset of the illness was tragically rapid in many men, who collapsed at work and elsewhere without warning, and sometimes were dead in a few hours. Men who were struck down suddenly were ordered by the Japanese to be left where they were till removed by the meagre hospital staffs, often over a considerable distance. The delays and hardships thus imposed lost many lives. Segregation of suspects was most difficult, as diarrhoea from other dietetic causes was almost universal in some camps. Facilities for boiling or chlorinating water were most inadequate. However, attempts were made to limit the spread of infection as far as possible by the control of the water supply and by sterilisation of mess gear, and nursing was carried out by volunteers with great devotion. A number of these volunteers lost their own lives from cholera. The classic pictures of cholera were seen in these outbreaks, with the extraordinarily rapid and overwhelming prostration, the copious vomiting and purging, with the characteristic pale fluid evacuations.

Dunlop, Hunt and others have described the early features of cholera as seen in these camps. Some details of the clinical picture were rather different from the average, possibly owing to the pre-existing debility of the men. Many of them already had diarrhoea before the onset of cholera. Vomiting was not always frequent, but in the early stages sudden faintness was common, with ringing in the ears, deafness and dimness of vision. The voice was faint and hoarse, and the whole appearance apathetic. Before the onset of cramps a firmness of the muscles was often detected. Later severe muscular cramps were frequent, and the men often passed swiftly into the algid phase, in which the sunken eyes and wrinkled skin, so easily seen on the hands, plainly showed the urgent danger of extreme fluid loss. Though men dying of cholera are often painfully conscious till

the close, many of these men died in that state of "coma vigil" once known to earlier students of typhoid fever. In many cases death followed a phase of fever and delirium. Those patients who survived usually suffered from oedema due to deprivation of protein. Uraemia was common as a terminal event, and was also an occasional late manifestation after apparent recovery. It was observed that some of the men who succumbed most quickly became cyanosed and shrunken despite little external fluid loss.

Under prevailing conditions any efforts made to restore the fluid balance of the body were perforce crude, but saline was administered intravenously to many patients and saved many lives. Salt solutions were sometimes made with distilled water, sometimes merely by boiling ordinary kitchen salt or rock salt in water, using rain water or even river water. These fluids were introduced into the peritoneal cavity with a syringe in some instances, and given intravenously in others. Distilled water was made from improvised stills, stolen petrol pipes being used for the coils and these being cooled with bamboo jackets and circulating water. In one camp the Japanese made a still available in a mobile laboratory. In Hintok 120 pints of saline solution were made in twenty-four hours by unceasing work, night and day. Great ingenuity was exercised in the making of intravenous sets from material at hand. Two medical officers of "F" Force, Captain Roy Mills, A.A.M.C., and Major W. J. E. Phillips, R.A.M.C., originated a cannula made from bamboo. Captain Mills used an old tin can, stethoscope rubber and bamboo cannulas made with a penknife, and with this equipment saved many lives in a party of 700 men attacked by severe cholera. Hypertonic solutions were used in some areas, double strength saline being employed, but these were more difficult to control. Potassium permanganate was tried in treatment, crystals wrapped in cigarette paper being administered, but it was abandoned, as it was disagreeable to the patients and ineffective. Morphine was prized when available, but was usually very scarce.

The mortality from cholera in these camps was about 40 to 50 per cent. In Hintok Camp 150 men were attacked out of 1,000 and 63 died. In Shimo Sonkurai of 2,000 men 220 had frank cholera and 105 died. There were probably another 250 who had mild infections. Even some of these figures, considering the circumstances, could be regarded as an achievement. The potential killing power of cholera was only too evident; in one outbreak among hospital patients in Tarsau the death rate rose to 80 per cent. Many men succumbed to a terminal attack of cholera following on other intercurrent nutritional and infective diseases. Deaths of men who had had cholera also occurred from malaria, dysentery and nutritional deficiencies long after the epidemic waves had passed.

REFERENCES

- A. E. COATES, *Med. Journ. Aust.*, 1 Jun. 1946.
E. E. DUNLOP, *Brit. Med. Journ.*, 5 Oct 1946.
D.G.M.S., *Army, Tech. Instr.*, No. 124.
D.G.M.S., R.A.A.F., *Tech. Instr.*, No. 38.