The splints are suitably padded and applied as in Fig. 3. It should be noted that the longer splint, on the lateral aspect, is twisted so as to lie away from the lateral epicondyle, and bent so as to lie over the acromion process. The splints are first fixed with two encircling bands of adhesive tape, and then

use of an ordinary arm sling to avoid the occurrence of non-union.

Unreduced Fractures Several Days Old.—Inevitably, in the present war, we will be faced with fractures that have not received adequate surgical attention for some days. The shaft of the humerus, without other injuries to prevent the erect posture, will come to little harm in a sling, but if the patient is recumbent considerable angulation and shortening may occur. We have seen several such fractures, and reduction has been impossible without some form of traction. A 3-lb. weight, held immediately beneath the olecranon process in a few turns of plaster bandage, has been

FIG. 2a.—Fractured shaft of humerus on Cramer wire abduction frame, with wire traction through the olecranon. Position on admission. FIGS. 2b and 2c.—Final result following immobilization with three splints and collar-and-cuff sling.

FIG. 3.—Front and back views of splinting for fractured shaft of humerus before application of bandage. Note method of bending the lateral splint.

bandaged over. Finally, a bandage in the form of a shoulder spica is applied, and the wrist is suspended by the collar and cuff, with the elbow at right angles. On no account should an ordinary sling be used, as this prevents the weight of the arm from acting on the fracture. For the same reason care should be taken to see that the shirt or other garment is not so arranged as to have the effect of a sling. No special attempt at reduction is made beyond the correction of any gross deformity. The patient is not confined to bed, and for the first two weeks he should be well propped up at night so that the arm is constantly vertical. Radiographs taken immediately after the application of splints will probably be disappointing, but five days later excellent position will have been obtained in the vast majority.

Cause of Displacement at Site of Fracture.—Importance is usually attached to the deforming influence of the adductor and abductor muscles attached to the upper part of the humerus. In practice, using the three-splint method, this consideration has been found to be largely theoretical. The reason advanced to account for this finding is that muscle spasm, which can never be continuous for long, disappears as soon as the fracture is immobilized. Should the fracture receive a sudden jolt within the first few days, muscle spasm reappears with its deforming influence for a few minutes, but position is soon corrected by the continuous action of gravity. In the abducted position the arm is much more liable to receive many minor jolts, and any displacement which is caused thereby is not subject to the same corrective force which now acts at right angles to the humeral shaft. Mention must be made of the oblique or unstable fracture of the shaft of the humerus. This is the type of fracture that led to the use of active extension, which is not only unnecessary but dangerous. A successful result following on treatment in abduction with skeletal traction is a matter for congratulation; treated in three splints with a collar-and-cuff sling, it is a matter of course.

Compound Fractures.—The method described is equally suited to compound fractures. Following the usual primary excision, a wound pack may be covered with a few turns of elastic adhesive bandage before the splints are applied. Wound-healing has been just as satisfactory with this form of "no-dressing technique" as with the more usual plaster cast. An exception to the use of a collar-and-cuff sling may be made when a portion of the humerus has been completely shot away. Actual shortening should be encouraged by the

very effective in obtaining full length in these cases. It should not be left in position longer than the two or three days necessary to obtain reduction.

Summary

An account of the three-splint method of treating fractures of the shaft of the humerus is given.

The success of this simple and well-tried method is considered worthy of rediscovery at the present time.

Other methods in vogue are compared unfavourably.

TUBERCULOSIS IN THE MERCHANT NAVY

BY

JOHN E. WOOD, M.R.C.S., L.R.C.P.

Medical Superintendent, King George's Sanatorium for Sailors, Liphook

Tuberculosis workers who deal largely with patients from a certain occupational group are naturally interested in the incidence of and mortality from the disease in that particular group. These figures, however, are generally difficult to obtain, and especially so in the case of the seafarer. Owing to the wide distribution of British seamen of the Merchant Navy, both afloat and ashore, there seems to be no way of obtaining actual incidence figures for the occupation as a whole, and only within the last decade or so have serious attempts been made to ascertain the mortality rate with reasonable accuracy.

At this critical time, when so much depends on the men of the Merchant Navy, closer attention has been drawn to the adverse conditions of their life. It is therefore appropriate to consider the prevalence of tuberculosis among them and discuss what steps can be taken to limit the number of victims. Proper incidence figures being unobtainable, investigations on the mortality rate are here briefly reviewed.

An annual return of deaths at sea is made by the Registrar-General of Shipping, but this of itself is insufficient, as it leaves out of consideration the much larger number of seamen ashore who are sick, are unemployed, or have left the sea entirely on account of sickness, age, or other reasons. As already

pointed out (Wood, 1928), the majority of those afflicted are likely to leave sea-going employment to obtain treatment ashore, and if treatment is of no avail their deaths would be recorded ashore. Thus the death rate afloat is of little use as an indication of the true mortality from the disease.

Statistical Investigations

In the Registrar-General's Decennial Supplement to his report on the Census of 1921, issued in 1927, an attempt was made to arrive at the mortality figure, and it was found that the death rate for all seamen afloat was nearly double the calculated rate. In view of this high figure the Board of Trade in 1929 initiated a further investigation for the period of 1929-30. This was carried out for the London School of Hygiene and Tropical Medicine by Major P. Granville Edge. The report of this investigation was published in 1932, and showed the many difficulties met with in the satisfactory determination of a population figure for seamen. This should be obtained from the Decennial Census of the general population—i.e., the number of seamen ashore—plus the annual returns of seamen at sea. Unfortunately the latest Census available at the time of this investigation was that of 1921. The population had therefore to be estimated, so the figures cannot be strictly accurate. Difficulty was also experienced in determining the number of deaths which could be properly attributed to service at sea among seamen as defined by the Board of Trade. But the deaths enumerated rightly included those of seamen at sea and ashore, both employed and unemployed.

In Table V of that report the death rate from respiratory tuberculosis among British seamen of all ages is given as 2.37 per 1,000, and in Table VIII the proportion of deaths from respiratory tuberculosis to total deaths is stated to be 9.5%. Even if these figures are only approximately correct, the mortality from this disease is obviously high. Of the deaths occurring within twelve months of leaving sea-going employment Fleet Surgeon Home (1934) found that 20% were due to tuberculosis.

It was not until the publication in 1938 of the Decennial Supplement to the 1931 Census that more definite information became available. The special section therein dealing with deaths among seamen is based on the Census returns for 1931 and the mortality figures for the 3 years 1930-2, to which are added the population afloat on the Census date and the deaths at sea or abroad for the corresponding years, obtained from the Registrar-General of Shipping. The returns have been adjusted to exclude fishermen, lascars, foreign seamen, and Irish Free State crews, whether ashore or afloat, and therefore apply to British seamen only. A slightly wider field of occupation is covered than that of the Board of Trade returns, but any possible variation due to this must be very small.

Table c of this report gives the number of deaths and the standardized mortality, analysed by cause and by age groups, and the following particulars are taken from it.

*Registrar-General's Decennial Supplement to the 1931 Census.—
Table c: Deaths and Standardized Mortality analysed
by Cause*

	No. of Deaths recorded in 1930-2 at Ages 20-65	Calculated Deaths, 20-65	Recorded per 100 calculated, 20-65
All causes	6,645	4,522	147
Violent causes	1,157	486	238
Tuberculosis (all forms)	1,231	830	148
Cancer	654	552	118
Diabetes	51	45	113
Cerebral haemorrhage	263	192	137
Heart diseases	861	674	128
Respiratory diseases	620	527	118
Gastric or duodenal ulcer	156	118	132

It will be seen that tuberculosis is the most frequent single cause of death for the total age group of 20 to 65. It is unfortunate that the figures for seamen refer to all forms of tuberculosis, for in all other occupations the deaths from respiratory tuberculosis are given apart from those of non-respiratory disease. Thus it is not possible to compare the figures for seamen with other occupations accurately.

In 1936 the M.O.H. for Cardiff, Dr. J. G. Wilson, published the tuberculosis mortality rate in the various districts of that

city for the period 1923-34. He showed that the death rate in the docks area was 3.4 per 1,000—twice as high as in other areas. But the rate refers only to seamen ashore, and must necessarily be higher than for the whole population of seamen ashore and afloat; it refers also to deaths from all forms of tuberculosis. Moreover, the tuberculous population included twice as many lascars and foreign seamen as British, and the high figure quoted is therefore not comparable with either the Board of Trade investigation or the Decennial Supplement, from both of which lascars and foreign seamen are purposely excluded. Tuberculosis among lascars is, in fact, a serious question which cannot be dealt with in this short paper.

While these figures of mortality in seamen are meagre and must be accepted with some reserve owing to the many difficulties in arriving at a correct figure, there seems no doubt that the death rate from tuberculosis among British seamen is considerably higher than that of the general population; but not so high as in the silica occupations and others in which the mortality is known to be exceptionally heavy.

Condition of Patient and his Response to Treatment

There is another aspect of the problem, however, which is worth consideration—viz., the condition of the patient when he does at last come for treatment, and the nature of his response to treatment. The following table gives the classification on admission to this sanatorium of 300 British seamen almost direct from sea, and the immediate results of treatment.

Classification	Cases	Results of Treatment			
		Quiescent	Improved	No Material Improvement	Dead
Class A	24	9	9	5	1
Class B :					
Group 1	8	6	1	1	
Group 2	107	52	43	12	
Group 3	161	10	31	69	51

The proportion of B3 cases is 54%. Of this group 30% actually died in the sanatorium and 43% made no material improvement. Thus treatment proved useless in 73% of the advanced cases. These figures are worse than in most administrative areas ashore. In the County of Lancashire, for the year 1936, the proportion of B2 and B3 cases combined was only 55.8% of the total number of new cases (G. Lissant Cox, 1936).

Earlier Diagnosis

What can be done to stop this ghastly succession of deaths and appalling waste of man-power, of men so urgently needed to-day? All tuberculosis workers know the answer: it is, of course, earlier diagnosis and earlier treatment.

It would be easy to write at length on the various factors of life at sea which may lower resistance to tuberculosis or tend to spread the disease, but few of them can be rectified for a very long time yet. Chief of these factors is, in my opinion, the overcrowding in living and sleeping quarters which is almost universal. The cubic space allotted is definitely below the minimum allowed ashore, and bad weather generally means closing whatever ventilation may be provided. It is to be hoped that some improvement in this respect will be made in the ships now being built. Improved washing and sanitary facilities are badly needed in most ships, and improved arrangements should be made for sterilization of verminous and infected bedding.

But earlier diagnosis can and should be made. It may not be generally known that medical examination of crews is not required by law, with the exception of boys under 18 and crews of emigrant ships. Examination is, however, generally required by the shipping companies, mainly to safeguard themselves against compensation claims and against the expense of treatment in foreign ports, for which they are legally responsible. Even so, the examination is generally perfunctory. Shipping Federation doctors are paid 1s. a head for these examinations—hardly an inducement to careful work. Better medical examination is a matter for the Shipping Federation and senior medical officers of shipping companies to encourage, and no doubt much could be achieved in this way if only the importance of the matter were realized.

But is not this the very kind of community, where men of all ages are living in such close contact and where there is no lack of carriers, in which mass radiography (whether by miniature screen photography or otherwise) is essentially called for? Wherever carried out, this aid to early diagnosis has proved of immense service. Already our ex-Royal Navy patients are being admitted at a much earlier stage of disease than before routine radiography was undertaken. Practical difficulties in the way of such a scheme are obvious, but with the necessary good will they can be overcome. What cannot be achieved by official means can at least be started by voluntary effort, and I am glad to say that research in this direction is about to be made by the Seamen's Hospital Society. When the value of such examination can be demonstrated clearly, official recognition should follow and the seaman victim of tuberculosis have a brighter future.

The proportion of "pick-ups" (a horrible term which seems to have come to stay!) from miniature mass radiography as given by different workers in this country (Dudley, 1941; Galbraith, 1941; Clark, Poulsson, and Gage, 1941; Clark, 1942) varies from 0.3 to 1.6%. The population of British seamen afloat was stated by the Registrar-General of Shipping to be 89,000 in 1931. Taking the number to-day as a round 100,000 and the proportion of cases found with active tuberculosis as 1%, we should expect that eventually 1,000 men would be removed from active service when all the 100,000 had been examined. But the examinations could only be done gradually, and the loss of men would therefore be gradual also, whilst after a year or two the number of men found affected should be very much less.

It has been said that such a loss of personnel is not practicable in wartime. But if sources of infection are allowed to remain the eventual loss is likely to be higher still. Conditions at sea to-day are worse than ever. The likelihood of infection is greater and the increased mental and physical strain must reduce resistance. Exposure or immersion due to enemy action also necessarily plays a part. No one can tell how long the war will last, and it would undoubtedly be sound policy to eliminate the open infectious cases as a beginning. It seems certain that after a few years of routine radiography and elimination of carriers the incidence of disease would rapidly diminish. Some system of medical record cards would have to be devised so that re-examination at suitable intervals could be arranged.

Earlier Treatment

Earlier diagnosis would be useless unless followed by earlier treatment. Here also there is room for improvement. Just as in the case of landmen, a man may ignore advice to have treatment and may continue to work, to his ultimate cost. Indeed, it is quite possible for a man rejected by one company's doctor to seek employment with another company or in a different port and to be accepted. Short of some medical record card as suggested above, there seems to be no way of stopping this; but such a system presents obvious difficulties. Those who make a diagnosis of tuberculosis in a seaman should therefore stress the seriousness of the matter and the necessity for early treatment. The word "tuberculosis" means little to these men. They may never have heard of the disease, and much less ever thought that they might themselves be afflicted. I believe that an educational anti-tuberculosis campaign, on the lines of those organized on land by the N.A.P.T., would be of immense value. By arousing the interest of the shipping companies and their medical staff it should be possible to organize simple talks to the men and to distribute suitable literature. This would help to secure both earlier diagnosis and earlier treatment, and the chronic cough would not be so readily overlooked by both the victim and the ship surgeon.

The provision of beds in suitable institutions for the number of patients expected may present difficulty, but the wide distribution among the different ports should make this problem capable of solution. It is difficult to say whether earlier diagnosis would materially shorten the duration of treatment required. In some cases this would be so; in others, in which collapse therapy by surgical means proved to be practicable because of less extensive disease, the duration of sanatorium treatment might be lengthened. Moreover, there should be fewer patients dying shortly after admission. A more careful

assignment of cases would be required so that beds available for active treatment should not be wasted on hopeless cases. It seems probable, however, that more beds would have to be made available in this sanatorium.

Summary

A brief review is given of the evidence available regarding the mortality from tuberculosis in the Merchant Navy.

It appears that the mortality rate is higher than that of the general population ashore.

Men from the Merchant Navy arrive for treatment in a more advanced stage of disease than the general population.

Earlier diagnosis is essential. This could be achieved by more careful routine physical examination, but, best of all, by routine radiography.

An extensive educational and anti-tuberculosis campaign should be organized with a view to earlier diagnosis and treatment.

In view of the importance of the Merchant Navy, every means possible should be employed to maintain the health of these men. Routine radiography is therefore fully justifiable, and would lead to the elimination of sources of infection.

Research in mass radiography for the Merchant Navy is about to be carried out by the Seamen's Hospital Society.

REFERENCES

- Clark, K. C. (1942). *Radiography*, 8, 18.
 — Poulsson, K. T., and Gage, H. C. (1941). *Brit. J. Radiol.*, 14, 250.
 Cox, G. Lissant (1936). Annual Report on Tuberculosis for Lancashire.
 Dudley, S. F. (1941). *Proc. roy. Soc. Med.*, 34, 401.
 Galbraith, D. (1941). *British Medical Journal*, 1, 699.
 Home, W. E. (1934). *Lancet*, 1, 1081.
 Wilson, J. G. (1936). *Ibid.*, 2, 645.
 Wood, J. E. (1928). *Brit. J. Tuberc.*, 22, 57.

PARALDEHYDE IN OBSTETRICS

WITH SPECIAL REFERENCE TO INTRAMUSCULAR INJECTIONS

BY

D. A. MITCHELL, M.D.Lond., F.R.C.S.Ed., M.R.C.O.G.
Gynaecological Surgeon, Royal United Hospital, Bath

Paraldehyde in various forms and prescriptions has been used in obstetrics as well as in other branches of medicine for a considerable number of years. It was highly extolled by F. N. Reynolds in his *Relief of Pain in Childbirth* (London, 1934) as one of the very best methods of relieving pain in labour. He advocated its use per rectum mixed with olive oil (1 dr. of paraldehyde to 1 oz. of olive oil, with an average dosage of 6 to 8 oz., according to the patient's weight). This was preceded about half an hour earlier by an injection of morphine gr. 1/6 with hyoscine gr. 1/150.

Particulars of the Method

I have used this method, mainly in primiparae, in a large number of cases for the past 8 years, both in hospital and in private practice. A midwife should carry out this treatment only on a doctor's instructions.* She must have a good knowledge of the technique of giving it, and must observe the following details:

1. The bowel should be empty at the time of injection.
2. The injection should be run into the rectum by tube and funnel, with a large catheter terminal, fairly rapidly (approximately 4 minutes) in between two pains. Should a pain occur during the injection the nurse should hold the buttocks together with a pad of gauze at the anus, to prevent return flow. The same precaution is necessary for about 10 minutes when the injection is completed.
3. In spite of the advocated dosage of 1 dr. of paraldehyde to 1 oz. of olive oil, it is better to put the dosage of paraldehyde estimated into a total of 5 to 6 oz. of olive oil, otherwise there is increased danger of its being returned.
4. Obviously a very low presenting part will add to the difficulty.

Main Uses.—With this method the ideal procedure is in a prolonged first stage, and for practical purposes this will mainly

* Report of investigation by the British College of Obstetricians and Gynaecologists, *Lancet*, 1936, 1, 283.