freely, and the apparatus well heated before the refuse is added; the fire
must never be allowed to get low, the fuel being added in small quantities
at short intervals, and not, as in the usual method, by the unintelligent,
a large quantity of fuel at one time, so that the minimum of heat is
produced and the maximum of smoke; the fire should always be burning
freely and clearly, giving the maximum heat for the amount of fuel con-
sumed. (2) The material for destruction must be added intelligently,
that is, not too much at a time. (3) All openings, with the exception of
the furnace door, must never be left open, as such a proceeding would
abolish the forced draught on which the working of the apparatus depends.
(4) The material in the destructor must be turned over at frequent
intervals or it does not become dried as quickly as it should. When
night-soil is being dealt with alone this is very marked.

The best fuel to use is, of course, coal, but wood works almost as well,
if intelligently used. Here we have been using eucalyptus wood, which
does not make a very hot flame, with complete success.

The cost of working has, so far, averaged 2 annas per hour for fuel,
esting 4 annas the 100 lbs. If the cost of the crude oil is also added
it comes to 11 annas an hour. Doubtless with more experience on the
part of the sweepers in stoking a saving on this item could be effected,
and also the greater number of hours the apparatus is being used would
comparatively reduce the amount of fuel used each hour.

The apparatus designed here is considered large enough to deal with
the refuse and excrement of half a battalion of infantry.

HYDROTHERAPY AS A FACTOR IN THE TREATMENT OF
ACUTE CROUPOUS PNEUMONIA.

By MAJOR C. W. R. HEALEY.
Royal Army Medical Corps.

In laying stress on a special line of treatment for acute croupous
pneumonia, the most widespread and fatal of all acute diseases, according
to Osler "killing more than diphtheria, and outranking even consumption
as a cause of death," I am conscious of the fact that this treatment
is not a new one; it is referred to in all modern books on medicine and
therapeutics, but to my mind they do not lay sufficient stress on it, and
none go into detail sufficiently to enable a person unacquainted with this
treatment to carry out the procedure in a manner which will act with
most benefit to the patient, and if not properly carried out the treatment
is practically useless.

In looking up the Army Medical Reports for the years 1899 to 1904,
I find that the total admissions and deaths from pneumonia in the Army
in the United Kingdom are as follows:
Clinical and other Notes

We have only to peruse these figures to see how very fatal acute croupous pneumonia is and how many deaths occur in the Army at home annually from it, and also what a very large proportion of the total deaths from all respiratory diseases are due to pneumonia. During the years 1899 to 1904 (inclusive) there were, taking an average for the six years, 112 deaths annually from pneumonia; 15.4 per cent. of all admissions were fatal. This is not an exceptionally high percentage of deaths, as the ordinary civil hospitals' records vary from 20 to 40 per cent.; the latter hospitals, however, receive more aged patients than are met with in military hospitals; they also do not as a rule have their cases under treatment as early as is the case in military hospitals. These two last factors have an immense influence on the mortality, the disease being extremely fatal in old age and in those who have neglected to lie up at the onset of their illness, so that a comparison cannot justly be made of the mortality from this disease in military and civil hospitals respectively.

Having treated thirty-six cases of acute croupous pneumonia during the last fifteen months in the Royal Infirmary, Dublin, only one of which terminated fatally, giving a percentage of 2.7 deaths, and having carried out a definite line of treatment in all the cases with considerable success, I consider I am justified in laying stress on the details of this treatment, in the hope that some of my brother officers may be tempted to give the method a further trial. It may be said that the number of cases under review is not sufficient to enable an accurate estimate of the value of the treatment to be formed. I have thought of this, but as a considerable time would elapse before I had an opportunity of treating a much larger number of cases, I came to the conclusion that I had enough material to justify my writing on the subject.

In dealing with the subject of hydrotherapy in the treatment of acute croupous pneumonia, I am not going into the question of the "cold bath treatment," as it would be difficult to carry out in most military hospitals owing to there being no suitable movable baths in many of them; besides which the treatment would require a larger personnel than is always desirable or usually necessary. I have, however, used the cold bath in enteric fever with prolonged high temperature with beneficial results, but I consider it a more difficult treatment to carry out, and one requiring more anxious watching than ordinary sponging with iced water, and I do not think that it has any advantages over the latter. I have
always found that no matter how high the temperature may be in pneumonia, it can be readily brought down to a safe point by iced sponging, sometimes supplemented by the application of lumps of ice lightly rubbed over the body. The cold sponging does not appear to produce any shock, while the cold bath may, so that at present sponging with iced water and the application of ice itself, if necessary, supplemented by an ice-bag to the head and to the affected side (if the pain is severe), is the form of hydrotherapy which I carry out in all my cases of acute croupous pneumonia.

I may state that in my experience it is remarkable how few sick attendants understand how to sponge a patient with iced water with a view to lowering the temperature. The usual procedure adopted, unless specially instructed, is to sponge over a small part of the surface of the body at a time, dry it thoroughly and then cover it up and sponge another small surface, and so on, until the whole body has been sponged. The temperature is then taken and found to be very slightly lowered, if at all; and it is taken for granted that sponging has been given a fair trial and has failed. In this way hydrotherapy has got somewhat into disrepute, whereas, if carried out thoroughly I believe it to be most valuable, and a method of treatment which can be utilised in whatever part of the world the patient may be stationed.

In treating acute croupous pneumonia we are treating an acute infectious disease which happily, in the large majority of cases, runs a short course, the temperature falling by crisis, generally from the fifth to the ninth day, sometimes before the fifth day and sometimes later than the ninth day, but these are exceptions.

Death in pneumonia may be due to certain complications such as meningitis, endocarditis or pericarditis: apart from these complications, which are comparatively rare, the majority of cases die either as the result of the toxæmia or of heart failure. Unfortunately, with our present knowledge, we are unable to combat the toxæmia; we have no specific to neutralise the poison. Anti-pneumococcic serum has been prepared, but so far it has not been proved that it affects the course of the disease in any marked degree in man.

The majority of the deaths in pneumonia are caused by cardiac failure, and this is due either to the action of the specific poison, to the prolonged high temperature, or to over-distension of the right chambers of the heart.

It has been already pointed out that we cannot at present neutralise the poison and we cannot prevent the right side of the heart becoming over-distended, owing partly to the lung consolidation which is always present. We can, however, mitigate the deleterious effect on the heart muscle of the prolonged high temperature; this is brought about by lowering the fever by sponging at regular intervals with iced water, and notwithstanding that some authorities state that the fever is beneficial,
it has been abundantly proved that a high and continuous temperature has a bad effect on the heart muscle.

The routine treatment I have adopted in acute croupous pneumonia is, that all cases with temperatures of over 103° F. are sponged with iced water every four hours. In cold sponging with a view to reducing temperature, it is important to note that a large surface of the body should be sponged at the same time; begin with the front of the body, as low as the waist, and the arms, thoroughly sponge until the surface is quite cold to the touch, then dry and cover lightly, then sponge the legs, and lastly the back. Having finished the back, take the temperature under the tongue; in violent and delirious patients it may not be possible to take the temperature in the mouth; in this case we have to be guided by the lowered pulse-rate as indicating a lowered temperature. If the

---

**Clinical Chart.**

---

temperature has been reduced to 101° F. or thereabouts, the sponging may be stopped; if it has not been lowered sufficiently the procedure has to be repeated and lumps of ice used; sometimes it is necessary to continue sponging for three-quarters of an hour to produce the desired effect. To assist in lowering the temperature, an ice-bag may be applied to the shorn scalp; an ice-bag sometimes relieves the intense pain in the side which some cases suffer from; many, however, do not like it, and Dr. Burney Yeo states that it ought not to be applied over the cardiac area, owing to its having a depressing effect on the heart.

The beneficial effect of iced sponging is most marked in the improved condition of the pulse, which slows down and becomes stronger when the temperature has been brought down several degrees; this is well shown in the accompanying four-hourly chart, in which the dots indicate
the temperature before sponging whilst the crosses show the point to which the temperature has been reduced, and in the pulse column the figures show the pulse-rate before sponging, whilst those underlined show it after sponging.

The temperature rises slowly again after sponging to probably what it was before it was done, but it takes an hour or two to do so: during this period of lowered temperature the cardiac muscle recovers somewhat from the depressing effect of the higher temperature, as is shown by the improvement in the pulse, and as this sponging is done every four hours it can be easily realised to what a great extent the heart must benefit by this treatment.

I have never seen any bad results from iced sponging in pneumonia, and though the patient may occasionally look blue after it, especially if it has been necessary to prolong it, the pulse will invariably be found to have improved, and many patients get quite fond of it.

I have heard it said that patients are sometimes too cyanosed to be cold sponged; if the cyanosis is associated with a high temperature and failing pulse, cold sponging will, by lowering the temperature, enable the cardiac muscle to recuperate somewhat and thereby help in diminishing the cyanosis. I am of opinion that if hydrotherapy were more universally adopted as an important factor in the treatment of pneumonia, that the death-rate would fall considerably. It must be remembered that it is only an important detail, in the treatment; there are many other important factors, such as cardiac tonics, stimulants, &c., which have not been referred to, being outside the scope of this article.

A NEW ALL-METAL SYRINGE FOR EUCAINE.

By Major F. J. W. Porter, D.S.O.
Royal Army Medical Corps.

This syringe, as depicted in the accompanying woodcut, is a modified pattern of the original instrument invented by Mr. A. E. J. Barker, F.R.C.S., and has been made by Messrs. Allen and Hanburys, Ltd., of 48, Wigmore Street, London, W., to my suggestion.

The syringe is of 20 c.c. capacity, and is constructed throughout of hard metal, consequently there are no parts which can get out of order during the process of sterilisation. The metal piston is so accurately ground to fit the barrel, that a little sterilised oil is required to lubricate it before use. It is graduated and fitted with a revolving stop. There is no possibility of fluid getting behind the piston when injecting into dense tissues, an advantage which users of the old syringe will at once appreciate. The connections of the needle carrier to the barrel are such as to prevent leakage at this point. The finger grips are large.

The Schimmel's needles used with this syringe are of larger gauge