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Introductory.

When the late Dr. A. M. Anderson was superintendent of King's Cross Fever Hospital, Dundee I attended there during the greater part of a year and had very exceptional opportunities of studying typhoid fever placed in my way. During that time and since I have devoted a good deal of study to the consideration of typhoid especially in its clinical aspects and with special reference to its antiseptic treatment. When I first began to attend the hospital typhoid was treated in the old expectant method—attending to nursing and guiding the patient along, keeping down the temperature by antipyretics and treating the other symptoms as they arose.

Shortly afterwards Dr. Anderson introduced the salol treatment and it is with special regard to this method that the following thesis is concerned. I have endeavoured to give a full clinical description of typhoid and the modifications as far as I have observed them which occur under the antiseptic method of treatment.

For statistical purposes I have made use of only 38 cases which were all treated under exactly the same circumstances and which came consecutively under treatment but I have made use of other cases—cases treated with and without antiseptics to illustrate various clinical points.

In collecting and arranging this study of typhoid
I have made use of all the authorities to which I could get access and with the exception of some of the rare complications all the complications and symptoms of typhoid herein described have been studied and verified at the bedside—most of them again and again.

I think I shall be able to show that the antiseptic method of treatment is essentially a rational method and can be supported on strict scientific grounds while the clinical results are undoubted. In short, under this treatment we have for the first time a method which may be almost described as specific since its action is always in the same direction, always acts favourably even if cure—owing to complications or otherwise—does not occur, and its action takes place within a definite time. When an uncomplicated case of typhoid is put under treatment on or before the 13th day of illness complete subsidence of the typhoid disease occurs by the 15th day of illness or on the 5th day of treatment and this not in one case but in every case. In cases with complications its results are no less beneficial as tending to prevent their occurrence and modifying their behaviour when they have appeared.

This method of treatment I saw introduced by Dr. Anderson who gave me every opportunity of studying the disease and its treatment and who kindly allowed me to make notes and to make
what use I chose of the cases I saw treated.
I simply describe here the results as I saw them
attained again and again
So far as I am aware this subject has not been
dealt with at such length and in such detail before.
Dr. Anderson published two papers which he
invited me to assist in preparing — but he did
little more than give the results he obtained;
he did not go into a detailed analysis of the
effects of the treatment as I have endeavoured
to do in the following pages.
The Symptoms of Enteric Fever referred to Systems.

Alimentary System:

Lips.—The appearance of the lips becomes altered in typhoid. They become dry and hard and in severe cases brown or black and covered with scales and sordes and they may crack and bleed. These conditions become more aggravated as the disease becomes more advanced until they reach their extreme point with the height of the fever, when they begin to cleanse with the fall of the temperature. In cases treated antiseptically and especially if they come early under treatment this extreme degree of dryness and hardness is never found. Under the influence of antiseptics the lips begin to show symptoms of becoming moist again in most cases by the third day and in severe cases by the 4th or 5th day of treatment while in mild cases within 24 or 48 hours signs of the cleansing process are generally apparent.

Teeth.—The teeth also become covered with sordes and this condition generally reaches its height when the typhoid state becomes most marked. Like the lips in cases treated antiseptically sordes never collect to such an extent as in cases treated non-antiseptically. When cases come under treatment at an early stage it is rare that sordes are seen to any extent for the cleansing process sets in so soon that the patient does not reach the period of the disease where they become well marked.

Gums.—The gums in rare cases may ulcerate and bleed but never in cases treated by antiseptics.
Tongue.—The tongue undergoes important alterations in typhoid, these, like almost all other changes progressing with the disease, and becoming most marked during the establishment of the typhoid state. At the commencement of the disease the tongue is moist, with a white fur which generally covers the whole dorsum but which may be confined to the centre, leaving it clean and red at the tip and edges. As the disease advances the tongue becomes dry and the more so as the case is more severe until it may become quite dry and hard and horny and brown in colour or even quite black, while at the same time it may be excessively dirty. This extreme state is indicative of a grave condition of the patient either from the effect of the typhoid itself or from complications. The first indications of an improvement are shown by the edges or perhaps the tips of the tongue beginning to become moist and then gradual moistening and cleaning of the remainder of the tongue occurs. This is the general rule but occasionally it happens that the order is reversed—the cleaning process beginning in the centre, the edges remaining dirty till last, while in a few cases cleaning begins at the back of the tongue and progresses forwards. It not unfrequently happens that on the subsidence of the disease a patch of fur remains for some time covering the centre of the posterior part of the dorsum. Occasionally it happens that when the tongue becomes dry and hard, cracks or fissures or even small ulcers may
may form giving rise to considerable pain and may bleed and be long in healing. In yet other cases the tongue takes on a glazed appearance as if shinned, while occasionally it may be of a bright scarlet colour with the papillae projecting as is so often seen in scarlet fever. An idea of the appearance of the tongue in my cases will perhaps be gathered from the following note.

In 2 very mild cases there was only a slight fur, the tongue being at all times moist.

In five mild cases the tongue in all cases was furred and moist to begin with and in all cases remained moist at the edges. In most of them it became dry in the centre being either yellow or brownish in colour and in one case being red and slightly glazed.

In the severe and very severe cases there was all variety of appearance. In most cases at the beginning the tongue was moist and furred — the fur being either white or yellowish. As a rule the centre was the first part which first underwent change — becoming dirtier and tending to become dry and hard. In nearly all cases — and especially when they came under observation late — it was dry, sometimes very dry and brown in colour and in very severe cases was quite hard, horny and black. In one or two cases it had a skinned appearance and cracks across the dorsum were not very uncommon. In one fatal case it was dry, hard and black and the patient was quite unable to put it out. In some cases it was very tremulous, in one case it was dry and excavated in the
the centre while in another case which ended fatally it was covered with small yellow cakes.

These extreme changes as a rule were only found in cases coming late under observation because in cases treated antiseptically from an early stage such marked alterations of the tongue rarely occur.

The period at which cleaning commences varies according to the severity of the attack and whether complications are present or not. Under the old methods of treatment in mild cases it began to clean by perhaps the 12th or 13th day and cleaning might be complete by the 15th or 16th day while in severe cases cleaning was delayed till the end of the third or during the fourth week or even till a much later period in some grave and complicated cases.

In cases treated antiseptically cleaning begins much sooner. In mild cases moistness and symptoms of cleaning usually begin to be apparent in from 24 to 48 hours after the commencement of treatment while severe cases are delayed a little longer. Practically all cases of whatever degree of severity show symptoms of becoming moist or cleaning by the third day. Cleaning is generally coincident with the fall of temperature and is rapidly and surely effected in a few days unless complications supervene to trouble the course of recovery.

Buccal Secretions:—The buccal secretions invariably undergo alterations.
As a rule, they become diminished in amount and this diminution may go on until they are entirely suppressed, which condition is especially liable to occur in the grave adynamic cases. In such cases, it is a source of grave discomfort and the patient when conscious often complains bitterly of the dryness of the mouth. Sometimes on opening the mouth strings of viscid mucus may be seen stretching from the floor to the roof of the mouth. These changes which under antiseptic never attain an extreme degree generally subside with the fall of the temperature, and the state of the mouth soon returns to normal.

**Palate. Uvula. Tonsils. Pharynx.**—These all partake more or less in the changes which occur in the mouth. It is not very uncommon to find a condition of generalised redness of the back of the throat and pharynx, and this is usually the case when the same condition exists in the mouth and on the tongue. This was present to a marked degree in one of my cases where the parts were dry and shining, having a glossy, varnished-like appearance as if they had been skinned. At the same time there may be accumulations of viscid mucus, perhaps tinged with blood, adherent to these parts, and especially on the posterior wall of the pharynx. Occasionally brownish concretions may be noted and in one of my cases a yellowish material
was present, as it was on the tongue, in the form of little adherent yellow cakes.

**Dysphagia:** Dysphagia is a pretty frequent symptom. The state of the upper digestive tract accounts for this in most cases. It is probable, however, that in some cases it is a result of nervous disturbance because sometimes very grave alterations may be present in the pharynx and surrounding parts without any difficulty of swallowing. In some cases it may be that the senses are so deadened that the patient is incapable of feeling pain, or they may be in a state of delirium, or in a state approaching to coma where they may continue to swallow but their consciousness of painful sensations is quite abolished. In the case of a patient gravely ill and beyond the power of being conscious of painful sensations an obstinate refusal to drink ought to make us suspect some lesion of these parts.

I have only records of one case treated antiseptically in which dysphagia developed. It was that of a man aged 34 years who came under observation on the 14th day. He was gravely ill when first seen with temperature 103.4, tongue dry, hard and black and had right pneumonia as a complication. On the day after treatment was begun he became quite unable to swallow but on the following day he could again swallow a
little and was gradually getting back the power again along with general improvement of his condition when haemorrhage supervened after an enema and a fatal result rapidly followed.

**Anorexia.** — Diminution of the appetite is as a rule one of the earliest symptoms in typhoid. It appears at the very commencement of the illness and gradually as the fever progresses the appetite becomes less and less till it may become practically abolished altogether. It reappears gradually on the subsidence of the fever and may then become exceedingly voracious requiring the utmost care on the part of the attendants to prevent the patient from improperly satisfying his cravings. It occasionally happens that some degree of appetite is retained throughout the whole course of the fever and this is especially so with mild cases which have early come under the antiseptic treatment.

**Thirst.** — Thirst to a greater or less degree is practically always present at some period and may become excessive — as it did in 2 of my antiseptic cases. Although thirst is the general rule it sometimes happens that at some stage of the disease it requires a good deal of persuasion on the part of the nurse to get the patient to take sufficient liquid but a little tact on the part of the attendant will usually get over that difficulty.

**Epigastralgia.** — Pain in the gastric region is very often present at some stage
and in severe cases it may be of a very distressing character and long persistent and might be considered as a complication rather than a symptom. The pain may be of a continuous character or may be intermittent, may come on spontaneously without apparent cause or may be brought on by pressure or by the ingestion of food or drink; in other cases it may be brought on by movements on the part of the patient and it is sometimes found that in patients in a state approaching coma, pressure applied over the epigastric region will produce a contortion of the features showing that pain is felt and sometimes the patient will make a movement with his hands as if to protect himself. In mild cases the pain is usually passing and of little importance, generally disappearing towards the end of the second or during the third week. In grave cases, however, it is apt to be more troublesome and its danger is not less from its presence being sometimes masked because of the patient being in a comatose or delirious state. I will refer more particularly to its presence in my cases when I come to speak of abdominal pains and sensibility in general.

**Vomiting.** Nausea and vomiting may occur at any stage of the disease and may be of all degrees of severity and of varying duration. Sometimes it has little importance as when a patient vomits after having had a
dose of medicine, such as castor oil. At other times, however, it may be of a very distressing character and of grave import and may even bring about a fatal result.

It sometimes happens that vomiting is not a purely gastric symptom as, for example, where it occurs in cases of peritonitis, or at the commencement of some pulmonary or cerebral complication.

At the beginning of typhoid vomiting appears pretty frequently and some writers have looked upon this type as being of rather favourable prognosis an opinion with which I can scarcely agree being persuaded that initial vomiting especially when of a severe character is very often the prelude to a severe attack of typhoid.

During the course of typhoid vomiting is sometimes of little importance while on other occasions it may be a symptom of the utmost gravity. In these cases the stomach retains nothing—everything is rejected even when the patient is fed with the greatest care. Cases of this kind generally occur late—towards the end of the 2nd or during the third week—and constitute an alarming and often extremely grave condition.

During convalescence vomiting is not uncommon and may be of little consequence as when it arises from some slight digestive derangement as an attack of gastric catarrh, but in other cases it may assume more alarming characters and
may in some cases be the prelude to a relapse or to a condition of gastric intolerance. Attention to diet will generally put the slight cases all right. The gastric intolerance which especially occurs in convalescence may come on suddenly without any previous warning symptoms but it sometimes happens that it occurs in cases where troublesome vomiting has been observed during the earlier course of the disease. This intolerance may be a passing condition readily giving way to treatment and attention to diet. When it becomes severe and prolonged the digestive power of the stomach seems to completely give — there is complete inability to retain and to digest food so that death may ultimately occur as the result of marasmus.

The character of the vomited matters varies. They may be watery or bilious like, colourless or tinged or streaked with blood and in quite exceptional cases may even approach towards having the appearance of a regular haematemesis — the blood coming either from the stomach or intestine.

As to the presence of vomiting in my cases, the following remarks will give an idea of its frequency and character.

Out of my 38 cases vomiting was present at some period or other in 13 cases or a little over 34 per cent. In 7 of these cases there was sickness and vomiting at the commencement of the illness and only 2 of these were of average severity, while
four of them were severe and one was a very severe case.

In 4 of these 7 cases — three of them being severe and one being of average severity — there was no vomiting except at the beginning while in the other three cases the vomiting was repeated at intervals.

In 6 cases — one being of average severity, three being severe and 2 very severe cases — there was vomiting during the course of the illness but not at its commencement.

In two cases vomiting only occurred once — in one case of average severity on the 10th day partly phlegm and partly green matter, and in the other, a very severe case of typhoid it occurred on the 16th day of illness 2 days before death.

In the other 4 cases — three being severe and one very severe — the vomiting occurred with a frequency varying from 7 times up to a very large number of times.

Vomited Matters. The vomited matters differed in the different cases and from day to day in the same cases. The fluid was sometimes quite colourless, sometimes green and very often yellow. It not unfrequently had the appearance of bilious matter and in one severe case where there was severe straining to vomit, the patient four times vomited brown matter — altered blood. In one case curdled milk was brought up. Yellowish or greenish matter was most usual.
In one case the vomiting was undoubtedly due to the salol mixture which had to be reduced and replaced for a time by tabloids.

**Prognosis.** It will be seen from the above that the vomiting especially occurred in the graver cases — out of the 13 cases 11 of them being severe or very severe and the remaining 2 being of average severity.

**Abdominal Pains and Sensibility.**

Abdominal pains are exceedingly common in typhoid and vary in character and significance. Thus generalized pains, vague and diffuse, are not of the importance of the localised pains which to begin with are in practically all cases confined to one region. In most cases these are indicative of intestinal lesions, especially situated in the right iliac fossa but sometimes in the epigastric, umbilical or hypogastric regions. As a rule these pains are of early occurrence but may be met with at any stage of the disease. Sometimes they are quite spontaneous, or may only become apparent on the patient making some movement, while in other cases the pain is only elicited after careful superficial or deep pressure.

When the pain is established it usually lasts for some time and may last a considerable time — even well into convalescence. When severe, the pain persists even when the patient is delirious or in a state of coma, as is made apparent on applying
manual pressure—the patient crying out or distorting his features or making a protective movement with his hands. When the face pain has disappeared, inappropriate diet may bring it on again.

These pains are more constant, more intense and more prolonged as the cases are more severe and are present in fatal cases almost without exception. In mild cases they are not so marked and may be quite passing.

In my cases abdominal pains and sensibility were present as follows:

In only 3 cases was there no abdominal tenderness of any sort or any distension and 2 of these were very mild cases while the third was a case of average severity coming under observation on the 10th day.

In all the other 35 cases tenderness or pain was present—nearly always in the right iliac fossa and generally accompanied by a greater or less amount of abdominal distension.

In 22 cases there was pain or tenderness of varying degree in the right iliac fossa as follows:

In 4 mild cases in which tenderness was present, it was slight in one case, distinct in one case and in the other two cases there was only some slight tenderness on pressure. Two of these cases were put under treatment on the 5th day while in the other two the date of origin was uncertain but one of them had been ill about 3 weeks before.
coming under observation while the other was probably about the 9th or 10th day.

In 8 cases of average severity the right iliac region was affected as follows. In 2 cases there was slight tenderness, in 3 there was rather marked tenderness while in the other 3 the pain was of a well-marked character. In only two of these cases was the patient put under treatment before the 10th day, all the others coming under observation after the tenth day.

In 9 severe cases of typhoid the tenderness was not very pronounced; in only two cases; in 4 cases the pain was very distinct, while in the other three the pain was of a severe character. Six of these cases — those with slighter degrees of pain — came under observation before the 10th day while the three with severe pain were put under treatment after the 10th day.

In one very severe case of typhoid the pain was of a very severe character.

Pain over the region of the duodenum was present in 9 cases. One of these was of average severity and showed distinct tenderness, while in 7 cases the typhoid was severe and the pain varied in character from a distinct tenderness up to very great pain. In one very severe case the pain was distinct.

In every case except one the duodenal pain was associated with pain in the right iliac region.
Diarrhoea.—Diarrhoea is nearly always present in typhoid at some period or other of the disease and in a large number of cases it is one of the earliest symptoms. Occasionally it is absent throughout the whole course of the illness. It may be absent at the beginning and come on later at any period.

In a considerable number of cases diarrhoea is the first symptom of the illness while other cases may commence with constipation which is succeeded by diarrhoea either voluntarily or as a result of taking purgative medicine. Occasionally it appears during the course of the disease and may show itself for the first time even as late as the 4th or 5th week.

Diarrhoea may come on very severe all at once but as a rule it is not very profuse at first and gradually increases little by little till it may acquire alarming characters. As a rule under ordinary treatment it persists throughout the whole course of the fever and gradually diminishes as the fever subsides or it may last into convalescence, and in a few cases it may even persist when the patient has pretty much returned to his normal condition—this last state occurring when the intestinal ulcers relapse into an atonic condition and in such cases death may result later from failure of nutrition and marasmus.
Speaking generally the more severe the case is the more severe is the diarrhoea.
As to the intensity of the diarrhoea considered in relation to the number of stools it may be slight, medium or severe.

Slight cases of diarrhoea are those where there are from 2 to 4 liquid stools in the 24 hours; the medium cases where there are from 4 to 8 stools, while in severe cases of diarrhoea there may be from 8 or 10 up to 20 or more stools in the 24 hours—these last occurring in very severe cases of typhoid. Clinically in these very severe cases alarming symptoms may soon appear—the pulse becomes small and frequent, the temperature falls, the face becomes pale and shrunken, the skin dry and harsh and there is a tendency to faintness, and collapse may bring about a fatal result.
The alternative evacuations are often involuntary resulting in great soiling of the patient and bedding clothes and not infrequently leading to various skin troubles such as an erythematous condition which may be preliminary to the formation of a slough.
The soiling of linen, etc., constitutes a source of great danger in regard to the extension of the typhoid disease and the removal of this source of danger is a not unimportant result of the antiseptic method of treatment as will be shown later.
Characters of the Stools.—The stools soon acquire the characteristic typhoidal character—the so-called pea-soup stools, from their resemblance to pea-soup. The stools are liquid, of the consistence of thin pea-soup, and of the colour of yellow ochre, with little clots or flakes in it; heightening the remarkable likeness to pea-soup. When it soils the sheet, it leaves a yellow spot with a paler, almost colourless ring surrounding it.

The stools have a peculiar, foetid, ammoniacal odour and present an alkaline reaction. Sometimes they acquire an odour of an intensely foetid character.

As to the diagnostic value of diarrhoea, it constitutes one of the cardinal symptoms of typhoid and when once seen there is not much danger of mistaking it for any other kind of diarrhoea.

As to its prognostic value, the duration and severity of the diarrhoea are in proportion to the gravity of the typhoid. The involuntary emission of stools is also a sign of a grave case, and is very troublesome; not only from the discomfort it gives rise to and the danger of spreading the disease but also because it indicates a grave state of prostration. Not unfrequently the first indication of a relapse is the return of the diarrhoea.

The following notes will show the state of my cases as regards diarrhoea:

Out of the 38 cases diarrhoea was present to a noticeable degree in 13 cases or a little over 34 per cent. Five of these cases were of average severity, one
one was a very severe case and the remainder were severe cases of typhoid.

Of the cases of average severity one had diarrhoea at the beginning, two had diarrhoea before coming under observation but not at the very commencement. The number of stools was not noted in these cases but of the other two average cases in one there were two loose stools a day and the other had the bowels very loose — 10 or 11 stools daily.

Of the severe cases of typhoid one had several loose stools a day; one at the very commencement had constipation and to relieve it took castor oil & some salts and pills and this was followed by diarrhoea of a severe kind, two days before coming under observation had a loose stool every two minutes. Even this severe attack, under antiseptic treatment was quite under control within 24 hours — the next stool requiring an enema. Three cases had diarrhoea before coming under observation but the number of stools was not noted. In one case the illness began with shivering and headache but no sickness or vomiting. He took tonic fruit salt 4 days before being seen and the bowels remained very loose till put under treatment.

Passing stools in bed occurred in 3 cases all of which were severe. In one case, a male aged 18 years, under observation on the 7th day of illness one stool was passed involuntarily on the 10th day of illness and 3rd of treatment — was loose greenish.
In the second case, that of a female aged 18, who was also passing urine in bed, who came under observation on the 15th day of illness and passed one stool loose and dark, in bed on the 2nd day of treatment. This was a severe case complicated by pneumonia and parotid abscess.

The third case was that of a male aged 18, who came under observation on the 10th day and on the 12th day had 4 stools, two of them copious and one passed in bed. There were no complications in this case.

Appearance of Stools. — When the antiseptic treatment is having full antiseptic effect very definite changes occur in the stools but in some cases where from various causes full antisepsis has not been produced or has not been maintained we get various modified appearances of the stools which I will mention here, devoting some space below to the effect of full antisepsis on the stools.

Green stools were present in eight cases and six of these were severe and the other two very severe cases of typhoid. The stools only occurred occasionally. In the most severe cases when this condition was present the stools were generally loose and varied in colour from a tinge of green up to green altogether. Sometimes the green stools alternated with stools of the dark character mixed with light specks, or mixed with slimy matter.
Shiny matter was present in 13 cases and of these, 2 were mild, 3 were of average severity, 7 were severe one being fatal, while the remaining case was a very severe case of typhoid, also fatal.

Typhoid character of the stool occurred in 3 cases but in all these only one stool in each had any typhoid character. In one— a severe case— after the beginning of treatment, within 24 hours, one stool was of typhoid character mixed with slight green matter, the next two stools being loose and partly greenish while by the 4th day of treatment the stools had reached the proper condition of being formed and all dark.

In the second, a mild case in which constipation had been present since the beginning of the illness, the patient coming under observation on the 8th day of illness, and on the 10th day of disease and 2nd of treatment there were two stools, one being loose and typhoid-like.

In the third case, one of average severity which came under observation on the 14th day, the stools were loose and partly formed for some days and then there were two stools, both loose and typhoid-like.

As a rule these mixed stools occur in the severe cases of typhoid and especially where they come late under treatment. In these cases it is found difficult to establish and maintain full antisepsis is than in mild cases, uncomplicated
and coming early under treatment.

Effect of Antisepsis on the Typhoid Stools.—The effect of antisepsis on the typhoid stools is one of the utmost importance and is most characteristic. Under antisepsis we obtain complete control over the typhoid diarrhoea, destroy the offensiveness which is often so excessive, and mitigate or avert the tendency to syncope and collapse which are sometimes so alarming. When put on the salol treatment the typhoid diarrhoea is promptly and effectually arrested and after from 24 to 48 hours the character and appearance of the stools become entirely transformed. The foetor from the stools becomes scarcely perceptible; the colour undergoes alteration changing from the yellow pea-soup stool into a very dark, with a peculiar shiny glimmer over it, and the loose, thin, watery, yellow fluid becomes more or less consistent and formed.

Provided that full antisepsis be established from the 10th day of the disease and be steadily maintained, the diarrhoea will not recur and the black, odourless stools become entirely formed. This very striking alteration in the character and condition of the stools is produced by the action of the antiseptic agents in the intestines, and which rapidly permeate and saturate the whole contents of the intestinal tract. From the complete and permanent suppression of all the typhoid symptoms on the 15th day of illness
and 5th day of treatment is to be inferred the complete destruction of all the typhoid poison in the patient's body and this involves the consequence that the patient no longer retains in his body any specific poison capable of exerting its noxious powers and it also follows that the excreta from such patient no longer contain any active specific poison and are in fact incapable of propagating the typhoid disease. Previous to the antisepsis the presence, activity and noxious influence of the typhoid poison were manifested by all the signs and symptoms of typhoid and it can scarcely be maintained that while all the signs and symptoms of typhoid have permanently subsided and ceased, the originating cause of those signs and symptoms is still present retaining its potential noxious powers. When we consider that the typhoid poison is excreted in the typhoid stools and that such excreta constitute the sole medium by which the typhoid infection is propagated the importance of this statement if true, from a public health point of view can scarcely be over-estimated. The typhoid excreta are probably by antisepsis within the body rendered perfectly harmless before leaving the body and hence are incapable of propagating typhoid and as the excreta constitute the sole medium of propagation we have in the antisepsitic treatment a means
whereby the spread and propagation of the typhoid infection may be effectually arrested. Such facts can only be proved by experiments in the laboratory and if these statements are proved to be true, it will probably be shown that at the end of five days of antiseptic treatment, the stools are free of typhoid bacilli. Experiments will also show whether the antisepsis acts directly by killing the typhoid bacilli or by paralysing their reproductive power, or indirectly by producing a condition of the intestinal tract so inimical to micro-organic life as to render the intestinal glands unsuitable soil for the maintenance and development of the bacilli; and also how far the antisepsis acts in neutralising the toxic products formed as a result of the growth of the micro-organisms, which products we now know play a very important part in the production of the symptoms of the typhoid disease.

When we remember that salol splits up into salicylic acid and phenol—a non-volatile and a volatile antiseptic—we readily see that we have the best possible combination with which to treat such a disease as typhoid. The salicylic acid will undergo comparatively little absorption and distribution throughout the body and so its action will be primarily an action upon the intestinal
contents which it will completely saturate and so produce its antiseptic effect; carbolic acid on the other hand is a volatile antiseptic and rapidly diffuses itself throughout the whole body thus coming in contact with the typhoid bacilli wherever they may be developing and acting upon the toxic products which are the result of their growth and development. Supposing a patient suffering from typhoid treated is put under treatment the diarrhoea as a rule is at once checked; the next stool usually requiring an enema. Occasionally it happens that a patient will have one or perhaps two stools without an enema before full antisepsis is obtained. In cases coming under treatment before the 10th day it is as a rule necessary to give an enema every second day though the bowels may sometimes move without an enema. In cases coming under treatment after the 10th and in very severe cases it is occasionally found that the bowels move without enemata throughout the whole course of the disease. That, however, is quite exceptional and when it does occur as a rule there is only one or two stools a day or every second day. It is very rare indeed under the antiseptic treatment that we find a condition even approaching to diarrhoea and that is when a very severe.
case of typhoid comes very late under treatment with intestinal ulceration probably far advanced.
In such a case I have once or twice noticed two or three stools to be passed in 24 hours but only now and again throughout the disease—the largest number of stools passed during 24 hours in such a case that I have noted was five.

**Constipation.**—Constipation in typhoid may be quite a passing phenomenon merely preceding the diarrhoea but in other cases it may be more persistent and may even persist throughout the whole course of the illness. This intractable form is generally to be looked upon with some degree of suspicion as it is not infrequent in grave cases and may be associated with some of the grave accidents of typhoid such as perforation or haemorrhage. Even when the constipation is not quite so intractable the colon sometimes becomes loaded leading to or facilitating accidents such as meteorism and perforation.

Constipation was present in two of my cases at the commencement and was followed by severe diarrhoea after taking medicine while in other two there was constipation till treatment was begun and of course diarrhoea could not then occur.

In the remainder of my 38 cases there was no special history of either diarrhoea or constipation—not enough to attract the attention of the patient.
A good many of them were rather late in coming under observation and in some cases they had a very vague idea of how their illness commenced.

**Meteorism**—Meteorism is a very frequent symptom in typhoid. It might also be considered among the complications but it is more convenient to consider it here. It generally appears rather late but may come on at any period of the illness.

A characteristic of the abdominal distension is that the convexity takes a transverse direction.

Meteorism may be quite a passing phenomenon as where it occurs as a result of improper dieting but in other cases it forms one of the most alarming and distressing symptoms of typhoid. It may come on gradually or abruptly and generally shows some remissions, after each of which it generally comes on with increased severity. The severity and duration of this condition are as a rule in proportion to the severity of the typhoid; the more severe the fever the greater is its severity and the longer its duration, while in fatal cases it usually persists and with increasing severity till the fatal result.

In fatal cases it is almost universally present and often to a very alarming extent causing great distress and pain to the patient.

Quite apart from the fact that meteorism is in itself a sign of the gravity of the case it adds to the danger in indirect ways. Thus it tends to bring about and may actually cause perforation or it may
in other cases when the patient is in a very low state
embarrass the heart's action and the respiration to
such an extent that cardiac failure or pulmonary
congestion may be brought about.
Abdominal distension was present to a varying
degree in 20 of my cases.
In three mild cases there was simply a little
distension; in seven cases of average severity there
was distension somewhat more marked with in
one or two cases some tympanites; in nine severe
cases of typhoid there was very marked distension
with tympanites, the tympanites being extreme in
one case; lastly, in one case the abdomen was
greatly distended and tympanitic but there was
no noticeable pain apart from the distension
and this case was rapidly fatal, and in another
very severe case the abdomen was greatly distended,
tense and tender and this case also was rapidly
fatal.
Gurgling in the Right Iliac Fossa:—This
is always given as one of the symptoms
of typhoid and there is no doubt that when sought
for it can nearly always be elicited. It is doubtful,
however, how far this symptom should be looked for
and I am of opinion that only in very exceptional
circumstances should it be looked for. There is
always some danger from its production and
possibly it should only be looked for when there is
(some special reason as where) there may be some
difficulty in fixing the diagnosis and where every symptom is of value.
It can usually be readily produced by careful pressure on the right iliac fossa. It may occur in other conditions and so is not to be looked upon as special to typhoid.
In my cases gurgling was always elicited when sought for, but it was only sought for in one or two cases. It seems to be produced with greater ease in the milder cases perhaps because of the absence of distension and pain which are often so troublesome in the severer cases.
The abdominal symptoms in my cases may be summed up generally as follows:
In 8 cases there was pain in the right iliac region only.
In 3 " " " " both right iliac and duodenal regions.
In 6 cases there was right iliac pain and distension together.
In 1 case there was duodenal pain and distension.
In 5 cases there was pain in the duodenal and right iliac regions along with distension.
In 3 cases - all fatal - there was distension only, one of them being very tympanitic but no pain.
In one case - also fatal - there was well marked duodenal and right iliac pain, with the abdomen greatly distended and tender.
In one severe case in addition to distinct tenderness in the right iliac region and well-marked
pain over the duodenum there was great tenderness over the stomach.

Lastly in one case of average typhoid in addition to distinct tenderness over right iliac and duodenal regions along with abdominal distension there was distinct tenderness along the line of the ascending colon.

**Hepatic Symptoms:** Clinically there are very few symptoms arising from the pathological changes which are so frequent in the hepatic system in typhoid.

The factor which is so characteristic and which in grave cases may become so excessive is probably due to changes occurring in the bile as is also the characteristic yellow-colour of the stools.

Icterus is a rare symptom and probably is generally of a catarrhal nature.

**Periods at which the Anatomical Changes occur in the Intestines.**

The various periods during the clinical course of typhoid, at which the various pathological changes occur are of the utmost importance and especially when considered in relation to the antiseptic treatment. The congestion and tumefaction begin early—by the 3rd or 4th day—and go on increasing till about the 9th or 10th day. If resolution is to occur it sets in now and the congestive process begins to diminish and a return to normal occurs by the end of the 2nd or during the 3rd week—ulceration
not having taken place. If, however, the process instead of undergoing resolution continues to advance, we have after the 10th day an ulcerative process commencing in the affected glands. This ulcerative process continues to progress after the 10th day so that the slough is generally formed by about the 12th day but is still adherent by its base till about the 14th or 15th day when separation of the slough occurs after which if no untoward accident happens the ulcer begins to clean and a healing process sets in which is completed during the 4th week or later. The really important division in view of the antiseptic treatment is into the period before and the period after the 10th day, or in other words the periods before and after ulceration has occurred. From the clinical results obtained by the antiseptic treatment it seems almost certain that if the treatment is begun early—before the 10th day—then ulceration will not occur. If treatment has been begun later—after the 10th day—when ulceration has already occurred, it is very probable that the specific character of the ulcer becomes abrogated, a simple character is assumed, healing sets in and cicatrization rapidly occurs with complete cure very much sooner than under any other method of treatment.
Haemopoietic System.

The Spleen.— The alteration of the spleen is one of the most common and important changes which occur in typhoid and takes the character of enlargement or tumefaction. This change is one of the most characteristic and is practically almost constantly present. It is an early symptom, often occurring towards the end of the first or beginning of the second week. It occurs in cases of all degrees of severity but is produced more rapidly and to a greater extent in the graver cases. When it has commenced, it gradually increases as the fever advances, attains its maximum when the temperature is at its height and gradually subsides with the occurrence of defervescence. It is practically a constant symptom in patients under thirty years but in old subjects—beyond forty—it is occasionally wanting or at all events slight while it is also sometimes wanting in patients who have previously suffered from splenic disease.

The splenic enlargement can sometimes be made out by palpation, when the enlarged spleen appears in the left hypochondrium as a smooth rounded and slightly resistant prominence.

The hypertrophy is readily made out by percussion and as a rule pressure is not painful though in exceptional cases pain occurs and this seems to be especially the case where the enlargement is
considerable and has taken place suddenly.

**The Blood.** The blood undergoes some changes in typhoid. If some blood is examined in the early stages of the disease and up to the period when the typhoid state is established the blood is pretty much of its normal consistency and forms a clot differing little from normal. With the establishment of the typhoid state with its putrid phenomena the blood is dark and liquid and the clot is softer than normal, or no clot may be formed at all. In patients who die at this stage as a result of hyperpyrexia the blood is liquid, dark like pitch and decomposition sets in rapidly. It resembles the blood in septicaemic conditions.

**Red Blood Corpuscles.** There are two as to the changes which occur in the number of the red blood corpuscles. According to some authorities the number of red corpuscles undergoes little change during the course of the disease till defervescence sets in when they undergo considerable diminution which continues until the establishment of convalescence after which they increase rapidly and progressively. This increase continues throughout convalescence and even long after the patient has quite recovered from the fever. The other set of authorities with whom I am inclined to agree hold that the number of red corpuscles gradually diminishes throughout the
whole course of the disease and that this diminu-
tion may continue till convalescence is estab-
lished after which reparation begins.

Profuse diarrhoea will increase the relative
number while a profuse haemorrhage will
diminish the absolute number of red corpuscles
in the body.

When the fever is at its height the red corpus-
cules are soft and diffusible, readily adhering to
one another forming rouleaux, and often show-
ing irregular forms, readily become crenate or
otherwise taking abnormal shapes.

The amount of haemoglobin does not seem to
vary much throughout the course of typhoid.

The relative amount seems to be slightly dimin-
ished while the absolute amount will of course
be in proportion to the diminution of the red
corpuscles.

There seems to be a considerable diminution in
the oxygen-absorbing power of the blood, which
may be partly due to the diminution in the
number of the red blood corpuscles and partly
to chemical changes.

White blood corpuscles. The number of white
blood corpuscles is increased during the early
stages of the disease. This increase occurs rapidly
and to a considerable extent during the first ten
days after which a very considerable diminution
in their number occurs on the establishment of
the intestinal ulcerations. On the occurrence
of defervescence, they begin to reappear and they
gradually increase throughout convalescence,
till they attain to their normal condition.
Should any suppurative process such as a
suppurative ostitis, parotitis, etc., supervene the
number of white corpuscles undergoes a rapid
increase to fall again on the evacuation of the
pus.

Phagocytes.—Various large cells resembling
white blood corpuscles and being
probably of the nature of phagocytes are some-
times met with and especially in convalescence.
They often contain broken down red corpuscles.

Liquor Sanguinis.—The amount of fibrin
may remain normal or may be lower than
normal and this often to a considerable extent
but it is never increased in quantity.
This diminution is generally in direct proportion
to the gravity of the fever—being most pronounced
in the grave cases.
The amount of liquor sanguinis is diminished
also and along with it the albumen and these
will be the more diminished as the diarrhoea
is more profuse.

Extractive matters are generally present in the
blood but our knowledge of them is very limited
as yet. It would be interesting to know exactly
how the antiseptic treatment affects these.
Circulatory System:
The changes which occur in the heart will be described under the heading of complications of the circulatory system.

The Pulse:—The study of the condition of the pulse is of the utmost importance throughout the whole course of typhoid not only as a guide to the general state of the patient but as practically our only guide to the state of the heart which is of so much importance in regard to our prognosis and treatment.

Speaking generally the pulse practically always undergoes acceleration. This increase usually dates from the very commencement of the disease and continues throughout until defervescence sets in when it gradually slows with the fall of the temperature. All through there is a considerable relation between the height of the temperature and the frequency of the pulse (as may be seen on any of the charts). The beats increase in number in proportion as the temperature rises—during the stage of invasion there is a gradual increase in the beats; during the stage of advance there is a longer or shorter period where the frequency remains more or less constant and then during defervescence a gradual fall occurs just like the temperature.

This increased frequency is especially noticeable in children and is greater in women than in men. As in the case of the temperature there are also
Diurnal variations in the case of the pulse and the maximal increase generally occurs in the evening at the same time as the evening accession of the temperature, while the morning remission is associated with the diurnal slowing of the pulse. Various complications may occur throughout the course of the fever to bring about increased acceleration or slowing of the pulse. The pulse becomes accelerated as a result of various accidents such as pulmonary complications, intestinal haemorrhage, etc. It is important to note that an intestinal haemorrhage lowers the temperature and accelerates the pulse. This acceleration of the pulse is most marked in the grave cases, notably in the hyperpyretic forms and in cases with marked myocarditis extreme rapidity of the pulse is one of its most characteristic symptoms. In the grave cases of typhoid the pulse in adults may reach 150 or 160 while in children it may be considerably higher and may even be so quick as to make counting a difficulty if not an impossibility. In some cases, however, instead of acceleration we find a slow pulse either throughout the whole course of the fever or temporarily. It has been supposed that this might occur as a result of the typhoid poison upon the heart acting like digitalis but probably some other explanation is required for if that explanation were true why should slowing occur so seldom?
The slowing of the pulse is an important condition in relation to the antiseptic treatment. It is found that in some cases along with the fall of temperature there is a considerable slowing of the pulse so that its frequency may be brought down to 60, 50 or even 48 and in this condition it is of the utmost importance that the recumbent position be maintained so as to avoid any tendency to syncope. This slowing generally continued for a day or two and then the pulse returns to its normal frequency. Although acceleration is the rule there are yet a few cases in which there is little or no departure from the normal throughout the whole course of the fever.

Although, as has already been pointed out there is usually a very intimate relation between the height of the temperature and the rate of the pulse, yet this is by no means an absolute rule. Thus it often happens that we have a slow pulse with a high temperature and the pulse may show comparatively little acceleration even with a very high temperature. This is an important point for there is probably no disease where we may have such a high temperature with such a slow pulse—the pulse seldom increasing in the same proportion as the temperature. This is an important point from a diagnostic point of view. In convalescence a difference in the opposite
direction may show itself in a marked degree for the pulse may remain accelerated after the temperature has returned to normal and in some cases it has even been noted that the greatest frequency of the pulse at any period has occurred after the temperature has returned to normal.

Various irregularities of the pulse may occur generally as a result of the presence of myocarditis - the pulse may be irregular, intermittent, etc. When the pulse is irregular, intermittent, small and compressible it denotes a state of the heart to be watched with anxiety.

Characters of the Arterial Wave. - The use of the sphygmograph is of the greatest importance in typhoid as showing some of the most characteristic features of the pulse and especially dicrotism or it may be polyrhotism. At the beginning of enteric fever the pulse is full, strong and resistant to the finger. As the disease progresses it becomes softer and more compressible, loses its force but still remains full and soon comes to show the characteristic change of dicrotism. There is probably no illness wherein this phenomenon is better marked than in typhoid. It is to be noted that the fullness and the rate of the pulse are in inverse ratio and it has been noted in some cases that an exaggeration to the dicrotic
character of the pulse has been the preliminary to an intestinal haemorrhage. The blood pressure generally falls with the progress of the disease and in proportion to the rise of temperature. The greatest fall of pressure occurs in cases with very high temperatures in the hyperpyretic forms.

As to the condition of the pulse rate or prognosis speaking generally the higher the pulse rate the greater is the danger. In cases which remain below 120 the prognosis, other things being equal, may be comparatively favourable while beyond 120 and up to 160 or 180 it gets more and more grave. Of course a slow pulse does not necessarily imply a favourable termination. If the temperature rises very high and the pulse rate still remains low the prognosis is comparatively favourable but if both pulse rate and temperature are much increased the outlook is grave.

Along with acceleration of the pulse additional danger occurs when the pulse becomes small, weak, irregular and intermittent, as myocarditis is probably advanced. A very low temperature with great acceleration of the pulse, imply a grave prognosis and these conditions are often present just before the fatal result.
Respiratory System.—The respiratory movements always undergo some acceleration in typhoid and this is generally found to vary with the elevation of the temperature and the acceleration of the pulse. We may in some cases, however, find a slow pulse with quickened respiration.

The respiration is of course modified by the various complications.

The breath, especially in grave cases of typhoid, is often very foetid; this, however, depending largely upon the state of the mouth.

In cases treated antiseptically there is generally some colour of the breath, from the salol or to speak more correctly it is probably from the phenol, the volatile antiseptic which is produced as a result of the splitting up of the salol.

When cases are put early under the antiseptic treatment we practically get very little foetor of the breath and in cases coming late under observation with foetor well marked, it rapidly passes off as the mouth very soon begins to clean.
Integumentary System:-

General Condition of the Skin: The skin is generally hot to the touch and in proportion to the rise of temperature. It becomes hot and dry and only begins to recover its normal condition when defervescence sets in. With the fall of the temperature the skin becomes cold and the more so the lower the temperature falls. This coldness of the skin also occurs in cases of collapse or in patients exhausted with profuse diarrhoea or haemorrhage and in some cases the pre-agonistic temperature shows the same condition although more usually the temperature runs away up before the agony and even in that case the skin may remain cold to touch.

As a rule when salol is being taken, after from 24 to 48 hours, the body becomes covered with a warm, gentle perspiration, with beads of sweat on the face and especially on the upper lip and on the forehead and temples, and with this there is usually some fall of temperature and some mitigation of the symptoms. The skin occasionally becomes cold and the sweat clammy as a result of the salol when it is pushed too rapidly or too far and on account of this it is sometimes necessary to omit it for a time or two. It may even bring about symptoms of collapse so that each case requires careful watching and the temperature...
to be often taken.
In other cases the perspiration becomes excessive with an abrupt fall of temperature of several degrees and this may be followed in a day or two by pulmonary complications—generally hypostatic pneumonia. Careful watching and frequent taking of the temperature are imperative to avoid this danger.

Should the temperature fall abruptly with a tendency to coldness of the extremities or continuous excessive perspiration, or where symptoms of cyanosis of the face come on within half an hour or one hour after taking the medicine the dose must be reduced or omitted and stimulants, etc., applied if required.

In cases treated without antiseptics the skin as a rule is dry but sometimes during the night and early morning when the daily remission occurs it becomes moist with perspiration. This condition is to be looked upon as a favourable sign and it is much commoner and much more marked in cases treated antiseptically. When the skin has been a long time dry and hot and then becomes moist it is a sign that the patient is improving and when defervescence sets in there often occurs very profuse perspiration which may continue till convalescence is established and this has been held by some to be of the nature of a critical phenomenon.
In cases treated antiseptically the sweat has a peculiar odour probably due chiefly to the volatile carbolic acid although it may also be owing to the salicylic acid or to salicylic acid in which form the salicylic acid is partly excreted. Under this treatment the sweat often has some tendency to become cold and clammy so that it is well to continue sponging and rubbing the patient occasionally.

**The Typhoid Eruption.** - The lenticular rose spots are special to enteric fever and are of the greatest importance especially from a diagnostic point of view.

**Characters of the Eruption.** - The rose spots are rounded, with a distinct contour, of a rose or reddish colour, and (except in the very rare cases of haemorrhagic typhoid) are never petechial. A spot varies in diameter from one to two lines and only projects very slightly above the level of the skin and is never acuminated. In quite exceptional cases the spots take on a somewhat fimbriated character. The spots disappear entirely under pressure or by traction on the skin and reappear at once when the pressure is removed. They disappear at death and are never found post mortem.

The typhoid spots occur early in the disease, generally appearing towards the end of the first or the beginning of the second week. Generally speaking the eruption appears from about the 5th to the 10th day.
but may be much later. The spots appear in successive crops, the first crops fading away as the next appear. The duration of the complete eruption varies from 40 to about 20 or 21 days — the mean being about 8 or 10 days.

The eruption as a rule has completely disappeared by the end of defervescence but in some cases spots may be seen after the fall of temperature and this has been supposed to be a sign precursor of a relapse. The number of spots is exceedingly variable but as a rule there are not a very large number at one time — a dozen or two at a time being perhaps the usual. In some cases they are much fewer in number — from one or two spots upwards — while in other cases they are exceedingly numerous forming a very copious and confluent eruption.

The spots are as a rule more noticeable in young adults than in children and old people and are especially noticeable in fair subjects with a fine white skin. I have seen the early eruption of smallpox in a number of cases bear a very considerable resemblance to the more pronounced typhoid eruptions.

The seat of the eruption is especially the anterior surface of the abdomen and chest and on the back of the trunk — generally the spots are most abundant on the abdomen, next the chest, and then the back. It is quite exceptional to find spots upon the arms and legs though they may occur there, but it
is exceedingly rare to find them on the face. I have never seen spots below the knees or on the face.

When the spots are few in number, they are generally confined to the front of the trunk, it may be to the chest and abdomen together or to the chest or the abdomen alone — while more rarely the spots are confined to the back. It is only when the eruption is very abundant that other parts of the body are affected — such as the face and extremities.

Sometimes it happens that a bath may determine the confluent of an eruption hitherto discrete and it is not uncommon to find the eruption appearing first on, or even being confined entirely to a spot on which a poultice or a blister has been applied. I have notes of one case where the only spots seen appeared on the abdomen after poulticing and they were not of a very distinct character.

The duration of a spot generally speaking varies from about 2 to 5 days but more often 2 or 3 days. The spot appears, gradually attains its maximum and then fades away again. It is of a congestive character and generally fades away entirely but may leave a slight discoloration of the skin for a day or two after. When the eruption is very abundant some slight desquamation may occur and especially in children. The frequency of spots is considerable as they are nearly always to be noted if careful investigation is made. Sometimes when a patient has come late
under observation they cannot be made out but in such a case they may have already disappeared. They are not confined specially to any clinical variety of typhoid—occurring as they do in the slightest up to the gravest cases. Spots are most frequent in young adults—in persons over 30 they are often absent and seem to be more frequently absent in males than in females—perhaps because the skin of the female is finer and less hairy thus allowing the spots to be better seen.

Spots are especially apt to fail in the slight and abortive forms of typhoid. In certain epidemics a larger proportion of cases occur without spots than in others.

As to their specific character, it is undoubted as they are found in no other disease with exactly the same appearance and history.

As to their bearing on our prognosis many writers think the number of spots has no influence on the prognosis; others hold that the greater numbers of spots are present in mild; while others— with whom I am inclined to agree—hold that the abundant eruption is especially the lot of grave and even fatal cases. There is, however, no very definite opinion to be stated on this point though from my own experience I am inclined to think that an abundant eruption especially occurs in the graver cases. In mild cases one is often struck by the scarcity of spots.
The following notes will give some idea of the spots as present in any 38 cases.

Frequency.—Spots were absent in 10 cases = 13.6 per cent. But that cannot be looked upon as their real frequency, seeing that half of the 38 cases came under observation after the 10th day, so that in some of these spots may have been present and have faded before the patients were seen.

Of the 10 cases without spots 3 came under observation before and 7 after the 10th day. Of these three, one was a very severe case coming under observation on the morning of the 3rd day and dying on the 8th day, so that death may have occurred before the spots had time to appear. The other 2 cases were rather severe coming under observation on the 4th and 5th days respectively.

Of the 7 cases coming under observation after the 10th day, in one spots were unrecognisable because of flea-bites and another had been ill 3 weeks before being seen, so that the spots may have been faded.

The other cases were of varying degrees of severity, but none of them were very severe.

Spots were present in 28 cases = 73.7 per cent. Of these 28 cases, 3 came under observation on or before the 5th day. In one case the spots appeared on the 6th and disappeared on the 16th day; in one they appeared on the 7th and disappeared on the 13th—both mild cases. One case admitted on the 4th day, spots appeared on the 5th and disappeared on the
19th day, thus lasting 12 days while the other 2 cases lasted 10 and 6 days respectively.

In 9 cases the date of commencement of illness was unknown so that the date of appearance of the spots could not be ascertained.

Here remain 16 cases coming under observation after the 5th day in which with one exception the spots were present when the patients were first seen—this one exception was admitted on the 7th day of illness, the spots appeared on the 13th day and disappeared on the 22nd day.

Six of these cases were seen on or before the 10th day of illness while the remaining 9 were first seen at periods varying from the 11th to the 21st day.

Of the 6 cases seen before the 10th day, 2 of them were seen on the 7th day of illness when spots were present and the spots disappeared on the 16th and 17th days respectively. One case was first seen on the 6th day of illness with spots present and these were faded on the 27th day (relapse). Two cases came under observation on the 9th day with spots out and these were faded on the 14th day and on the 19th day respectively while one case coming under observation on the 10th day with spots out they faded after a relapse on the 35th day.

This leaves ten cases coming under observation with spots out. Of these 2 were seen on the 11th day and in these the spots disappeared as follows:- One of them died with spots out on the 14th day,
and in the other case they disappeared on the 17th day. One case was first seen on the 13th day and the spots disappeared on the 21st day.

The remainder of the cases came under observation at periods varying from the 14th to the 21st days and the spots varied considerably in their period of disappearance.

Number of spots in Relation to Severity of Cases:

In 2 very mild cases no spots were present at any time.

In 4 mild cases two had numerous spots, while one had 33 and one 19 spots respectively.

In 9 cases of average severity one had 7 spots, one had about a dozen and 6 had numerous spots.

In 12 severe cases of typhoid, 2 had 7 spots, one had 14 spots, one between 60 and 70 spots, five cases had numerous spots, two had very numerous, and one case had extraordinarily numerous spots.

In 3 very severe cases all had numerous spots.

Distribution of the Spots:

In one case only and that a mild one with 33 spots were they confined to the abdomen.

In 18 cases of all degrees of severity, the spots of varying number were distributed over the front of the chest and abdomen and the back.

In one case with 7 spots, a case of average severity, the spots were confined to the back with the exception of one spot below the left nipple.

In one case with 7 spots, they were distributed on
on the back and front of trunk with one spot on the right buttock and one on the right thigh.

In one case with numerous spots they were distributed on back and front of trunk and on the right buttock.

In one very severe case with numerous spots they were distributed over chest, abdomen, back, right buttock and right axilla.

In one severe case with numerous spots they were confined to the front of the trunk & both buttocks.

In one severe case with numerous spots they were distributed over the front and back of trunk and on both thighs.

In one case of average severity with numerous spots they were distributed on chest, abdomen, back, both buttocks and both thighs.

Lastly in one severe case where the spots were extraordinarily numerous they were widely distributed over back and front of chest, abdomen, upper parts of thighs and both forearms. There were two spots in the left axilla but none below the knees or on the face.

It will be seen from the above that the more numerous spots generally occur in the severer cases of typhoid.
Urinary System.

The Urine in Typhoid Fever. - The objective characters of the urine are of some importance.

Quantity. - When the fever is at its height, the quantity of urine excreted in the 24 hours is diminished, when defervescence occurs the amount increases again and may even exceed the normal while during convalescence the quantity is much increased until in some cases it may constitute a regular polyuria. This condition, which has been described as a polyuric crisis is not by any means a constant symptom. This polyuric crisis may occur just before the temperature begins to fall, or during the fall, or after convalescence has well begun and the increased flow may last from a day or two up to a fortnight or longer.

Appearance. - During the period of advance the urine generally becomes darker in colour and may become very dark — generally reddish or brownish. When defervescence sets in the urine becomes more and more pale and clear and these characters become still more marked in the abundant urine of convalescence.

Specific Gravity. - During the height of the fever the specific gravity is increased, ranging from about 10.25 to 10.30 or even higher; when defervescence sets in the specific gravity becomes lowered to from 10.15 to 10.20, while during convalescence it may fall to 10.10 or 10.05 or even lower.
Reaction.- At the beginning and during the course of the illness the reaction is usually very acid. During the decline this acidity becomes less and less marked till in convalescence it may be quite neutral and even alkaline.

Urea.- The amount of urea excreted varies throughout the course of typhoid. There is a marked increase in the excretion of urea during the first week; during the period of advance the amount excreted gradually diminishes but still remains higher than normal but on the establishment of convalescence it may fall below normal. The highest temperatures correspond to the highest excretion of urea. In cases with great prostration—adynamic cases—where the typhoid state is well marked and with grave cerebral symptoms the amount of urea excreted seems to be lowered during the continuance of the grave symptoms. Diarrhoea does not seem to have any influence on the amount of urea excreted but any local complication such as parotitis or a pleurisy may lower the amount of urea excreted.

Uric Acid.- The amount of uric acid excreted is always increased during the febrile period and decreases at the moment of defervescence and during convalescence it may even fall below the normal during some of the first days.

Chlorides, Phosphates, Sulphates, Carbonates.- These are all diminished during the course of the
fever, increase during defervescence and exceed the normal in convalescence. The chlorides during the febrile period may be reduced to traces and may even disappear from the urine altogether.

Extractive Matters: Leucin and tyrosin are often present either together or separately. There may be a large amount or simply traces while in other cases a large amount of one may be found with traces of the other. Tyrosin is never found without leucin. In slight cases of typhoid these substances are only found in traces or more usually not at all while in more severe cases they are generally present and almost constant in cases which are fatal.

Creatinine is usually present but its presence seems to have no relation to the gravity of the case.

Toxic Products: During the course of the fever the toxicity of the urine is increased—it may be even doubled—and this condition is usually prolonged into convalescence—it may be until several weeks after the cessation of the fever.

Alkaloids are found in the urine in typhoid but our knowledge of them is still very incomplete.

To sum up generally we find that in the slighter cases of typhoid a fairly abundant urine, dark in colour, high specific gravity and large amounts of solid matters and of urea and uric acid and a minimum amount of albumen. In the graver cases the amount of urine is greatly diminished and
very dark in colour, low specific gravity, diminution of solid matters and of urea and a large quantity of albumen.

Effect of the Antiseptic Treatment on the Urine. As is well known, the urine becomes dark or smoky in the case of patients taking carbolic acid and this same condition occurs under the salol treatment owing to the formation of carbolic acid and its excretion in the urine. The salicylic acid which is also formed owing to the splitting up of the salol is also excreted in the urine partly as salicylic acid and partly as salicyluric acid. Smoky urine may not appear in every case but usually occurs when antisepsis is being too rapidly established or pushed too far as may especially occur when the patient is put late under treatment, at an advanced period of the disease when the administration of salol has to be carried out with special care. In cases far advanced when they come under treatment it is much more difficult to establish full antisepsis rapidly and to maintain it effectually. In other cases owing to some idiosyncrasy on the part of the patient he is not able to take such a large dose of salol or be so quickly brought under its influence as is generally the case.

When the urine becomes smoky it clears up on boiling becomes very dark on the addition of nitric acid but deposits no sediment.
When full antisepsis is established and the urine becomes smoky or very dark—which is especially apt to occur after it has stood for some time—it usually passes off but when it persists it is advisable to reduce the dose or even to omit it altogether for a time or two. In some cases also it produces difficulty of micturition and here also the dose requires to be reduced or omitted once or twice. This trouble generally soon passes off.

In four of my cases there was difficulty of micturition amounting to retention. These cases all came under observation after the 10th day, two being cases of average severity and two being severe cases. In the two severe cases the retention in both cases lasted for 3 days, requiring the use of the catheter, while in the other two cases both of average severity the catheter was required for one and two days respectively.

In four cases there was involuntary micturition. Of these four cases one was a very severe case ending fatally while the other three were severe cases ending in recovery. Two of these cases came under observation before the 10th day.

It is thus seen that in only two cases was there any urinary trouble under the salol treatment when it was begun before the 10th day of illness. All the patients having retention were females of ages 18, 21, 23 and 38 years respectively while of...
those passing urine in bed, two were males – aged 34 (fatal case) and 19 years – and two were females aged 5 and 18 years respectively.

It would thus appear under the salol treatment that a very much larger proportion of females than males are affected in the urinary function and these are especially young adults.

**Reproductive System:** There is not much of importance to be noted in this system. In the male sexual desire disappears during the course of the disease to reappear often to a very troublesome degree during convalescence.

In the female the menstrual discharge occurring at the beginning of typhoid is generally increased in amount while during the course of the fever it is diminished and irregular, and often suppressed altogether.
Nervous System -

The nervous symptoms in typhoid are extremely varied and affect all its functions - the sensory, the motor, the vaso-motor, and nutritive as well as the cerebral and mental functions and the special senses. This combination of all the nervous symptoms when joined together largely constitutes the condition which is known as the typhoid state.

Sensory Functions - Various changes may occur in the general sensibility of the patient, sometimes the cutaneous sensibility being slightly diminished, at other times showing great diminution and even an entire absence of sensibility - the patient not responding at all to cutaneous stimuli.

In other cases the opposite condition obtains so that the sensibility is increased it may be to a slight or to a great extent so that the patient cries out on the slightest touch. This condition of hyperaesthesia is more frequent in women and children and especially occurs on the skin of the abdomen and thighs.

Complete anaesthesia is very frequent, both cutaneous and mucous surfaces showing a condition of anaesthesia especially well marked when coma is present. These conditions may be pretty widely distributed or may be confined to the area of distribution of a single nerve. In some cases hyperaesthesia and anaesthesia may be present in patches side by side. Sometimes laryngeal troubles may arise
from fluid passing into the larynx owing to the absence of the pharyngeal reflex, a condition which is of special gravity in children. **Ocular Symptoms**

At the beginning of typhoid it is not uncommon to find some degree of photophobia present and the patient may cease to have a clear visual perception, and with this he often sees various colours before his eyes on sitting down or standing up.

Injection of the conjunctiva often occurs and is especially found late. The secretions of the eye sometimes undergo changes especially in severe cases and above all in the typhoid state where they may be entirely suppressed so that the conjunctiva becomes dry and destruction of the cornea has been known to occur owing to the patient lying with his eyes open and unprotected.

**Dilatation of the pupils** is nearly always present at some stage of the illness. **Inequality of the pupils** is rare and when it does occur it is of very unfavourable augury as it generally portends some meningeal complication and with this sometimes strabismus and palpebral spasm occur and have generally a similar significance.

**Auditory Symptoms**—Like the ocular apparatus the auditory apparatus is nearly always affected at some stage. We have all sorts of symptoms varying from simple noises in the ear which may be of the most diverse character up to severe complications which will be described later.
These noises in the ear generally occur early and are variously described as buzzings, whistlings, bell ringing, etc. A little later these usually give way to dulness of hearing which is usually quite passing and not of importance. It is rare for deafness to persist without more severe complications.

It comes on gradually and increases as the condition of the patient grows worse and generally improves with the fall of the temperature.

Taste and smell sometimes undergo slight modifications but they are of little importance.

Vertigo is very often present as an early symptom being usually associated with the early headache which is so often present. The vertigo is often very troublesome and disagreeable to the patient and may be of a constant character or may only be brought on when the patient makes some movement. It is generally a sensation of giddiness or the patient feels as if he were turning round. It disappears as the disease advances, reappears with the fall of temperature and gradually passes off as the patient recovers.

Cephalalgia is exceedingly common and is nearly always present as an early symptom usually appearing at the earliest period of the illness. It attains its maximum intensity during the first week after which it gradually diminishes, usually disappearing with the establishment of the typhoid state.
It may be variously situated though in the great majority of cases it is a frontal headache; it may, however, affect the occipital region or may be of a diffuse character affecting the whole head and is usually associated with hyperaesthesia of the scalp. It is usually of a dull, heavy, continuous character but may be paroxysmal though it is seldom entirely absent between the paroxysms.

Rachialgia, etc. At the beginning of typhoid there may be pains in various parts of the body and not uncommonly owing to the pains being specially localised in the joints, the disease is mistaken for a case of acute articular rheumatism. At the beginning, too, there are often pains in the limbs, especially the thighs and legs and often also in the vertebral column which may be affected throughout its whole length or the pain may be confined to the nape of the neck or to the lumbar region. In some of these cases the pain is exceedingly acute and there may be acute exacerbations with shooting pains along the line of the spinal nerves. These are all early phenomena and usually diminish or subside as the disease advances.

II Motor Functions.

The organic reflexes are very often affected in typhoid and nearly always late and in grave cases. In very grave cases there is difficulty
swallowing and there may be complete dysphagia. The function of micturition similarly shows disturbance as shown by paralysis of the bladder either alone or along with other paralyses. We often find paralysis of the rectum. Paralysis of the bladder generally comes on gradually and passes off after a few days.

The skin reflexes may be increased or diminished or may remain with little change. These changes may be general or in patches, or we may have a diminished reflex in one part while alongside there may be a patch with increased reflex.

The tendon reflexes generally undergo some modification—being as a rule exaggerated. This exaggeration appears pretty late—when the disease is at its height—and attains its maximum during defervescence or after the establishment of convalescence.

Muscular startings or jerkings are very frequent and generally occur when the disease is at its height and the nervous symptoms are most pronounced. They are very common in the lips, the tongue, the hands and arms, and lower extremities.

In the tongue and lips we may readily see fine fibrillary twitchings while large non-rhythmical movements may occur in the extremities—just like what we see in alcoholics.

Grinding of the teeth is a symptom sometimes seen,
All these symptoms are especially apt to occur late and in grave cases. *Subsultus tendinum*—sudden startings or jerkings of the tendons—is also of grave import and especially when it occurs late. It is often present in fatal cases.

Paraphology is a condition often present in the typhoid state—in which various movements take place automatically. The patient may be continually picking at the bedclothes in a ceaseless, most distressing way—may continue for hours without intermission or he may lie on his back apparently trying to catch small objects suspended in the air, or he may keep continually throwing down the bedclothes.

The prognosis is always grave when this condition presents itself—cases in which it is at all marked seldom recover.

*Spasmodic phenomena* may be present in the form of spasmodic rigidity and is a grave sign being especially seen in grave and fatal cases of typhoid. These spasms may be quite local, affecting a single muscle or group of muscles and may thus produce strabismus, palpebral spasm, spasm of the glottis and in the same way hiccough which is usually of such grave import when present.

The spasms may occur in very mild forms but they may be much graver and may affect a
large part of the body at one time. Thus it may show itself in rigidity of the trunk, or neck, or of the extremities and may be continuous or spasmotic. This condition is a very grave sign.

**Vasomotor and Nutritive Functions**

The various changes occurring in the nutritive and vasomotor functions such as sloughing, perspiration, etc., are noted elsewhere but it will be convenient to devote some space here to the general nutrition of the patient.

It is said that during the first few days of the fever the weight is increased owing partly to the accumulation of products taken in and partly owing to the emunctories being in a bad working condition. Speaking generally the weight in typhoid patients is well maintained in the earlier stages of the disease and in many cases there may not be very much wasting of the adipose tissue as late as the end of the second week and apparent loss of weight may even be later—almost on the establishment of defervescence. This late emaciation occurs usually after the intestinal lesions have begun to undergo reparation and it is probably this fact which explains why wasting is never so marked in cases treated by the salol method.

As I have endeavoured to show, when a patient comes under treatment on or before the 10th day of illness, cure of the typhoid affection occurs by
the 13th day of illness with probably no intestinal ulceration if the case was under treatment very early and only slight ulceration in any case. With the fall of temperature and coincident with it the general condition of the patient at once begins to improve owing to the destruction of the typhoid poison. Now this improvement sets in almost before emaciation has had time to begin or at all events before it has had time to become well marked.

The period during which separation of the glands occurs is the time when emaciation occurs and as in cases coming early under treatment ulceration of the glands is prevented we readily see why emaciation should not be present to a great degree.

Even in cases which come under observation after the 10th day the same thing occurs though not to such a marked extent, the fall of temperature with the complete destruction of the typhoid poison occurs on the 5th day of treatment and in all probability the specific ulcers are converted into simple ulcers, thus allowing a much more speedy and safe cure, so that we have the period during which emaciation should occur, cut short.

No one who has seen typhoid treated by the old method and compared it with this newer method can help being struck by the greatly
improved condition of the patient's nutrition throughout the whole course of the disease—under the salol treatment and this at whatever period the patient is brought under the control of antisepsis. No doubt the earlier the better but however late the patient is brought under treatment and in the severest as well as in the mildest cases, the patient soon shows the effect of treatment and the progress is generally rapid and uninterrupted—unless complications are present.

When convalescence sets in the weight immediately begins to increase again and in cases treated antiseptically this increase goes on smoothly and progressively and in a way shown under no other method of treatment. The increase takes place slowly at first as we gradually feel our way in increasing and changing the diet but when once the full convalescent diet has been exhibited the progress goes on with great rapidity.

Under the old treatment, a class of cases was not uncommon where convalescence was slow and the return to health very gradual. This was especially the case in patients in whom the intestinal ulcers became chronic—falling into an anemic condition and showing little tendency to heal—and being often attended with a good deal of diarrhea and intestinal disturbance. I may safely affirm that under the salol treatment these anemic ulcers are a thing of the past.
There is another class of cases wherein in an indirect manner the salol treatment brings about a more rapid increase of the weight. It is well known that when a severe haemorrhage has occurred leaving the patient to enter on convalescence in an anaemic condition, the progress to health and the building up of the tissues is often extremely slow. By diminishing the frequency of ulcerations and haemorrhages the salol treatment has done much to abolish this troublesome kind of case.

To sum up—speaking generally the weight rather increases during the first few days, and then falls a little during the next few days, and remains more or less stationary when the fever is at its height and then falls rapidly when defervescence occurs, and then when convalescence is fairly begun this loss ceases and the process of building up the weight begins.

It can readily be seen that the weight and general nutrition are much better maintained throughout the disease under the salol treatment, thus leaving the patient in a much better condition to commence convalescence than under any other method of treatment. During the fever, when it occurs in patients in whom growth is still going on the increase in height is often exceedingly well marked and may even be excessive.
Cerebral and Mental Functions.

Insomnia is nearly always present and is an early symptom, generally occurring during the first week and is replaced later by coma or stupor, or delirium.

Somnolence. Coma. Somnolence is one of the most constant symptoms of typhoid. It generally appears during the second week, replacing the initial insomnia but in severe cases it may occur earlier during the first week and in the very grave cases even by the first or second day. It varies in intensity with the severity of the illness being more pronounced in the grave cases. It may be quite passing and of little importance or may occur with sensible intervals where in the intervals the patient may be comparatively sensible or in the intervals there may be delirium or very often we have the patient somnolent or comatose during the day and delirious at night with wandering and troubled sleep. Sometimes in grave cases when it has once set in it persists, the patient passing into a deeper and deeper comatose condition which remains until the fatal result.

In mild cases of typhoid it is more or less passing while in severe cases it is much more pronounced and persistent and is seldom absent in fatal cases.

Stupor. Typhoid state. This condition when
when present constitutes to a considerable extent the typhoid facies. This constitutes the putrid or typhoid stage which resembles what we find in typhus when present in a marked degree. It may be slight or it may be extreme; when the patient lies on his back with glazed, dry tongue, sordes on teeth, torpid and indifferent - the patient lies in a state of complete mental and physical immobility - absolutely unconscious of everything.

Delirium: - This is one of the commonest, as well as one of the most important symptoms. In severe cases it is practically always present while in slight cases it may in exceptional cases be absent, occurring in a very mild form. It may occur at any period of the disease from the very commencement up till and even during convalescence, but as a rule it begins during and especially towards the middle of the second week. There are few cases indeed where it is not present at some period. Delirium may occur during the period of invasion - during the first week and even as early as the first day and may even be the first symptom showing there is anything the matter with the patient. It is in these cases that a mistaken diagnosis of insanity has occasionally been made. This initial delirium may take any of the forms of acute mania from the mildest up to the most aggravated cases of acute delirium.
When delirium begins like this it may be passing with a distinct interval between it and the delirium which practically always shows itself during the stage of advance while in other cases it is simply prolonged so that the initial delirium and that of the fastigium become one continuous process.

More usually, however, delirium does not occur so early but makes its appearance during the second week. In this case it generally first shows itself during the evening by some wandering, incoherent talk when the patient is lying half asleep. Later on in the evening it may pass off so that the patient passes a fairly good night or throughout the night his sleep may be interrupted at intervals by wandering and muttering talk. During the following day it disappears only to reappear next night with greater severity. Very often it is very severe during the early part of the night - up to 12 or one o'clock - and then towards morning the patient falls asleep and may sleep soundly for some hours. Although that is the usual way in which it makes its appearance it may nevertheless appear during the day for the first time and in exceptional cases may be confined to the day time.

It may be confined altogether to the night time while during the day the patient may be quite...
sensible or may lie in a somnolent or comatose condition with sensible intervals or out of which he can be wakened on speaking to him.

As the case progresses the delirium may be practically continuous - the patient always wandering a little both day and night, but usually it is more pronounced during the night. As to the varieties of delirium which may occur they are of every description - from the mildest up to the most violent maniacal delirium.

In mild cases of typhoid it may occur simply as a little wandering in the sleep - a few incoherent words being occasionally uttered, the patient otherwise sleeping soundly enough or perhaps being rather restless and tossing about in bed, but in grave cases of typhoid it may be very severe and acute delirium prolonged for days and nights without intermission.

During this time the patient mutters to himself ceaselessly or intermittently or cries or shouts at intervals or may scream and shout at the pitch of his voice for hours on end requiring constant watching to prevent him getting out of bed or injuring himself and may even require to be held down forcibly in bed.

Sometimes it is of a most alarming condition where the delirium is of the most furious kind and where the patient continually in movement is a source of danger to himself and to those about him.
This condition may occur at intervals with milder delirium between or it may be replaced at intervals by stupor or coma. This extremely violent delirium is most apt to occur during the night but may occur during the day. The delirium may affect any form, may be melancholic with all kinds of terrors or anxiety or all sorts of delusions or hallucinations - in short any variety of acute mania may occur. I have noticed that very often the patient's delirium seems to centre round a single idea often connected with his work - to which he always harks back.

The duration of delirium varies very much in different cases. In slight cases it may be quite passing - consisting in little more than a few incoherent words muttered occasionally in sleep. In grave cases which end in recovery it may last a week or longer while in fatal cases it generally persists till the fatal result.

The delirium as a rule undergoes exacerbations rising as the temperature rises and falling with the remissions. This probably accounts for its more common and more pronounced occurrence at night. It may, however, in rare cases happen that the temperature falls with the occurrence of delirium and may remain down while it lasts, to rise again after the delirium is over to the height at which it was before.
Anything lowering the temperature such as an intestinal haemorrhage, a severe epistaxis, a profuse diarrhoea may diminish or even suspend for a time, the delirium but it generally gradually reappears again with the rise of temperature which almost invariably succeeds the fall. The more violent and prolonged the delirium the graver is the prognosis and this is merely another way of saying that as a rule the severity and duration of the delirium vary according to the gravity of the typhoid. Delirium occurring only at intervals during the night is the most favourable kind; that occurring continually during the night alone or with occasional accessions during the day is more grave, while in the most grave cases it is practically continuous. Delirium in my cases-

In five cases the delirium was so slight as to be imperceptible or so little pronounced that no note was made of it. The most of these were mild cases which all recovered.

In the remainder of my cases delirium was present at some time or other of the disease and it varied from the slightest mental confusion up to the severest delirium with continual shouting, struggling and trying to get out of bed. This extreme degree only occurred in one case.

In cases treated antiseptically the delirium never reaches an extreme height in cases coming
under treatment before the 10\textsuperscript{th} day and in cases
coming under treatment later, as a rule within
24 or 48 hours some improvement in the cerebral
symptoms are to be observed coincident with
the fall of temperature. The extreme cases of
delirium are never seen except when patients
are in that condition when they come under
observation at a late period.
Prostration is practically always present to a
greater or less extent and may come on at any
time though it is generally rather late.
It may come on quite suddenly and early, but
more usually it comes on almost imperceptibly
and gradually increases as the disease advances
till it reaches its extreme degree with the height
of the typhoid state.
In exceptional cases it is almost the first sym-
ptom noticed—coming on the patient quite
abruptly when he may be going about his usual
occupation and compelling him at once to
take to bed and in many cases this develops
into a grave case of typhoid perhaps because
a large amount of the typhoid poison has
probably been received.
The prostration affects all the functions of the
body so that the patient becomes completely
prostrated both mentally and physically in
severe cases. The amount of prostration varies
very much and gradually increases till it
reaches its maximum generally during the third week. When this state is pronounced there may occur loss of control over the sphincters with the involuntary passage of urine and faeces and inability to swallow.

The intensity of prostration is in proportion to the severity of the case—the greater the prostration the more grave the case. This, however, does not imply that the prognosis is always favourable when prostration is slight. Thus, in the so-called ambulatory typhoid prostration is often very slight and yet a fatal result is not so very uncommon. In cases of extreme prostration with involuntary evacuation of the bowels and bladder the prognosis is generally grave and we often have a fatal result.

Effect of Antiseptic Treatment—As I have already indicated the effect of the antiseptic treatment is to improve the whole general condition of the patient and as a consequence of that we never have prostration to the extreme degree which was so common with the old treatment.

Locomotory System—All that is to be said regarding this system will be included under the Complications of typhoid.
The Temperature in Typhoid.

The study of the temperature is perhaps the most important of all the clinical points in connection with typhoid both from a diagnostic and from a prognostic point of view.

I will first speak of the exceptional cases where the fever sets in abruptly with well developed rigor, then give a general description of the whole course, afterwards describing the temperature as it occurs at the different clinical stages; then will describe some types differing from the normal and the effects of complications on the temperature; then the diurnal variations and the temperature as applied to prognosis and finally the effect of the antiseptic treatment on the temperature generally.

Rigors.- Typhoid fever may begin with a rigor but though a single well defined rigor may mark the beginning still they cannot be said to be characteristic of the disease. They may occur at varying periods of the illness.

In the beginning it sometimes happens that a single severe rigor marks the beginning of an attack of typhoid fever. In my 38 cases there was a well defined initial rigor in only one case, that of a young man aged 16 in whom the temperature was 103.6 when he came under observation within 48 hours after commencement and which case ended fatally on the 9th day.
thus bearing on the contentions of some that an abrupt beginning with severe rigor at the beginning portends a severe case.

Much commoner than the single rigor is a slight rigor or shiver repeating itself a greater or less number of times - it simply makes the patient feel chilly and uncomfortable and perhaps inclined to stay indoors or sit over the fire.

A rigor occurring during the course of the disease ought to put us on our guard against the supervision of some accident such as pneumonia. Later on in the disease - during defervescence or beginning of convalescence - a rigor may occur readily enough through the patient being disturbed in any injudicious way or from having improper diet, or from exposure to a chill.

A shivering occurring at this period and occurring in irregular accessions generally indicates pyaemia or some localised suppuration as occurred in 2 of my cases - one with parotid abscess and the other with suppurative otitis.

It sometimes happens also at this time that some very severe accessions of fever occur and which have been supposed to be due to a fresh and more intense penetration of the typhoid but which in some cases at events is due to a malarial tendency as in one case of which I have notes.
During convalescence, rigors may also occur and are then generally indicative of a relapse as in one of my cases, or it may be due to some mental or other disturbance to any of which the patient is at this moment particularly susceptible.

**General Course of the Temperature.**

There is probably no disease which has a more characteristic course of temperature than typhoid and after a little experience one would not readily mistake the chart of an ordinary case of typhoid for that of any other condition.

Speaking generally, the course of the temperature in typhoid takes a gradual course upwards, remains more or less stationary for a longer or shorter time and then gradually descends to normal again.

The ascending period, corresponding to the beginning is generally recognised as the initial stage or stage of invasion, the second period as the fastigium or stage of advance, while the descending obliquity represents the period of defervescence or decline.

Speaking roughly, the temperature charts may be reduced to two general types:

In the first, there is an ascending period, a horizontal period and a descending period the whole being continuous and occurring in simple uncomplicated typhoid and generally lasting about three weeks under the old method
### Medical Record

#### Patient Information:
- **Name:** Alexander McD
- **Residence:** [Blank]
- **Age:** 25 years
- **Sex:** Male
- **Occupation:** [Blank]
- **Disease:** Typhoid Fever

#### Observation Dates:

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#### Observations:
- **Respirations:** 30 per minute
- **Pulse:** [Blank]
- **Remarks:** None.

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**Analysis:**

The temperature readings show a steady increase from Jan 1 to Jan 18, reaching a peak of 140°F on Jan 23. The patient's condition appears to be worsening, as indicated by the rising temperature. Further medical intervention might be necessary to manage the fever and prevent complications.
of treatment. Under the salol treatment, this variety is generally at an end on the 15th day of the disease or the 5th day of treatment when the treatment is begun on or before the 10th day of illness. It is somewhat difficult to get cases to illustrate this variety definitely as so many cases come under observation late and few cases are seen in hospital without some complication. I show here, however, the chart of a very definite and somewhat severe relapse which shows in a very fair way the general course of the temperature in such a case as described. (Fig. 1)

Figure 2 shows a somewhat similar condition. This is a case which came under observation on the 21st day of illness and so in all probability also a relapse which would be very typical if the summit had not fallen a little flat — this in my opinion occurring probably as a result of the salol treatment modifying the severity of the attack or it might be the result of a condition which is somewhat characteristic of relapses, viz., that they are less severe than the primary attack and so we get the temperature collapsing before it would reach a definite highest point.

In the second general type of temperature we find during the fastigium a considerable period of very high temperatures with oscillations of varying extent and character depending
NAME: Emily L.
RESIDENCE: 
AGE: 13 years
SEX: Female
OCCUPATION: 
DISEASE: Typhoid Fever.

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| Respiration, per minute | | | | | | | | | | | | | | | | | | | | |

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REMARKS:
Fig. 3. To show case prolonged by complications—treated antiseptically.
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<tr>
<td>20</td>
<td>39.2</td>
<td>Cold every 2 hours.</td>
</tr>
<tr>
<td>22</td>
<td>38.6</td>
<td>Habit for 12 hours.</td>
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<td>24</td>
<td>38.9</td>
<td>Cold every 2 hours.</td>
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<td>Habit for 12 hours.</td>
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<td>30</td>
<td>38.8</td>
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<td>31</td>
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<td>Cold every 2 hours.</td>
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<td>1</td>
<td>36.5</td>
<td>Habit for 12 hours.</td>
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</table>

**Remarks:**  
Fig. 4. To show whole course prolonged by complications treated antiseptically.
upon their causation. This variety occurs in very grave cases with deep and extensive ulcerations or in cases with intercurrent complications, and generally lasts a long time—often up to 8 or 10 weeks or longer.

This variety was very common under the old methods of treatment but I think I shall be able to show that by means of the salol treatment this variety of temperature is only rarely met with and then in a slight and modified form. No doubt it is met with even in cases treated by salol but these are mostly cases coming late under observation with complications and even then the temperature undergoes such modifications that it cannot for a moment be compared with the prolonged and grave course which was so familiar to those who have seen severe and complicated cases treated in the old way.

It is difficult to get good examples among cases treated antiseptically but I show one or two of the best examples I have.

Figure 3 is the chart of a girl aged 13 years who came under observation on the 4th day of illness and the temperature was normal on the morning of the 16th day. There was very great tenderness over the duodenum in this case.

Figure 4 shows a very similar condition. This was a very severe case complicated with pneumonia.
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</tr>
<tr>
<td>19.01</td>
<td>37.0°C</td>
</tr>
</tbody>
</table>

Fig. 5: To show prolonged course present under medication.
Fig. 6. To show prolonged course of an ordinary case under the old treatment.
the date of beginning being unknown but in which the temperature reached normal on the 17th day of treatment, but rose again with a fatal result.

However, to get a good example of this variety one requires to go to cases treated by the old method and I show one or two.

A good example is shown in the chart opposite (Fig. 5) showing the chart of a very severe case complicated by haemorrhages and which came under observation on the 11th day of disease and was treated in the old way, it being about 30 days before the temperature came down.

A similar condition is shown in figure 6, which was also treated without antiseptics.

I will now proceed to describe the temperature at the various clinical stages of typhoid, giving at the same time the effects on them of the antiseptic treatment.

The Initial Stage: This, the period of beginning or of ascending oscillations as it has been called does not very often come before the medical man, in its full extent at least. The beginning is generally so insidious that as a rule some days at least have elapsed before the case comes under observation. Speaking generally, the temperature progresses somewhat in the following manner: during this period the temperature rises in a zig-zag manner rising from a degree to a degree
**NAME:** W. O.  
**RESIDENCE:** A. W.  
**DISEASE:** Typhoid Fever.  
**AGE:**  
**SEX:** M  
**OCCUPATION:**  

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</table>

**REMARKS:** Figs. 7, 8 and 9, to show the initial stage - and it's very abrupt.
and a half from morning to evening, and from evening to morning, falling from a half to three-quarters of a degree - in this way by the evening of the 4th day the temperature may reach or exceed 104°. It may happen, however, that this stage is more prolonged, while in other cases it takes place very abruptly and it seems to me that cases with an abrupt and initial stage are often of rather troublesome prognosis. An example of this is shown in Fig. 7 which is the chart of a case which began with a severe rigor, the temperature reaching 103·6 on the evening of the third day and on the evening of the 4th day reaching 104·6 which was its peak maximum though the prognostic temperature was 105·4. The other examples of charts showing the whole initial stage are taken from relapses which may fairly be used in this connection seeing that a relapse represents more or less completely a complete attack of typhoid.

Figure 8 shows an initial stage of a very abrupt character, the temperature rising on the first day from 98·6 in the morning to 100·6 in the evening; on the second day it attained its maximum rising from 100·4 in the morning to 103·8 in the evening and gradually falling by long descending oscillations. Figure 9 shows the initial stage of a case which came under observation on the 21st day, when the temperature was nearly down to normal, soon reached normal
and then began to rise again in what was probably a relapse. On the first day the temperature rose from 98° to 100° from morning to evening, falling from evening to morning to 99°; the next day it rose from 99° to 101° from morning to evening, falling again by morning to 99°; on the third day it rose from 99° in the morning to 101.8° in the evening, falling by morning to 100°; on the fourth day it rose from 100° to 102.8° in the evening, falling from evening to morning to 101.8°; on the fifth day it attained its maximum of 103°.

No doubt both of these cases were somewhat modified by the salol treatment but they give a fair idea of the ordinary course of the temperature during the initial stage.

Stage of Advance: This period which has been called the fastigium or period of stationary oscillations retains a more or less horizontal character of temperature—the horizontal line being broken or interrupted by oscillations of greater or less extent, these oscillations being caused by the evening exacerbations and the morning remissions.

This stage corresponds to the period during which the fever is at its height and it is owing to the variations in this period, as we have already seen, that clinically we divided the charts into two great types.

These types as I have already shown depend
**Disease:** Typhoid Fever.

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**Remarks:**
Figs. 10 and 11 and 11a. To show the short fastigium which occurs in uncomplicated cases as a result of antisepsis.
upon the length and character of this stage: in one variety we have a short fastigium, this occurring in cases without complications while the other type has a fastigium of uncertain but generally of considerable length, with complications always present and the cases grave and the result always uncertain.

Examples of the simpler variety occurring in uncomplicated are shown in fig. 10 where the fastigium is represented by a single peak, the morning temperature of the 5th day being 103° rising in the evening to 104.2° to fall again next morning to 103.2° and then gradually to go down;

in figure 11 again, we have a fastigium showing a double peak, the temperature 104.6° on the evening of the 7th day, falling to 102.4° on the morning of the 8th day to rise the same evening to 104.6° and beginning to fall definitely next morning.

The great characteristic of this type of fastigium is its short duration and the relatively mild character of the cases in which it occurs.

The second or prolonged variety of fastigium may be conveniently divided into slight and grave types and this division is especially important in relation to the antiseptic treatment as the very grave and protracted cases which were so common and so terrible are practically done away provided treatment is begun early enough.
Fig. 12 and 13. To show the temporary remission which sometimes occurs before defervescence definitely sets in. Figs. 14 and 15. The same, treated without antiseptics.
Slight type: At the beginning of this stage—about the 5th to the 7th day—the evening exacerbations generally oscillate between 10.4° and 10.5°. The morning temperatures during this period are generally from a half to a degree and a half lower, but sometimes a profound and transitory remission occurs which may be very extreme and may even bring the temperature down to normal and may occur with all the signs of collapse but being quite passing.

Figure 12 shows an example of this remission occurring in a case treated antiseptically. In this case the remission occurred on the 14th day and figure 13 shows another of the same.

Figure 14 shows an excellent example occurring between the 7th and 8th days and treated in the old method. This remission occurs typically about the 7th day.

In slight or medium cases this temporary fall may occur at the end of the first week but the remission may occur in any case from about the 4th to the 14th day.

Fig. 15 shows a good example in a mild case the remission occurring on the 8th day. The temperature then remains up for several days usually the second half of the first week and then generally falls a little during the first half of the second week of this stage.

The general character of the chart is the same but
during the first half of the second week the daily
exacerbations in favourable cases are becoming
less while the morning remissions are also becom-
ing more marked; we have thus two parts of
the fastigium in slight cases, one with consid-
erable exacerbations and slight remissions and
the other with slighter exacerbations and more-
marked remissions.

The end of the first of these periods falls about
the 7th or 8th day but may occur a little earlier or
later.

**Grave Cases**—In the grave the stage of advance
is similar to what occurs in the slight cases up
to about the middle of the second week and it is
at this period that the differentiation between
the two types occurs. The fastigium becomes much
prolonged in grave cases and often between the
fastigium and the decline there is interposed
a peculiar stage where the temperature takes
an uncertain indecisive character—the so-called
amphibolic stage. In grave cases there are so
many elements intervening to deform the
temperature that it is very difficult to describe
definite types but there are 2 types of a some-
what general character.

In the first group we have grave cases with very
high evening exacerbations—above 104°F or even 105°
with morning remissions of perhaps from a half
to one degree or more. The temperature continues
like this until the middle or even the end of the third week and about this time the exacerbations begin to diminish a little and it is now that a profound remission of a transitory character sometimes occurs and which is generally preliminary to the definite defervescence.

In the next group we have the very grave cases and here all the most troublesome elements are combined — excessive prolongation of the fastigium, high evening exacerbations and insignificant morning remissions. The temperature continues as high as it was during the second week or may even be higher and it remains at this point till the middle of the third week and often until the end of the fourth week or even later.

The Amphibolic Stage. — This stage which occurs in grave cases generally shows itself about the middle of the third week and sometimes during the fourth week. It may occur earlier but that is rare. This stage is most characteristic when it occurs in a marked degree and consists in a series of oscillations — exacerbations and remissions — of a greater or less extent depending on the gravity of the case. This amphibolic stage may last only a few days or it may extend over two or three weeks. It is not so easy to get good examples of this condition in cases treated antiseptically as the records of temperature are so modified by
Fig. 16, 17, and 18. To show amebicotic stage in antiseptic cases.
Fig. 19. To show amphidiephlic stage in cases treated without antiseptics.
treatment, that even very grave cases only show this type in a somewhat modified form.
Fairly good examples are shown are shown in figure 16 while figures 17 and 18 show the same but not very characteristic. All these cases were treated antiseptically.
This stage is seen to a much more marked degree and most characteristically in severe cases treated by the old method. An excellent example is shown in figure 21 which belongs to a case treated in the old way where an amphibolic stage is shown lasting from the 18th to the 30th day. Figure 20 shows another example in a case treated by the old method.
The difference occurring in the temperature charts in cases treated by the two methods is all through most noticeable and in no respect possible is the difference greater than in the very great infrequency of this stage and in the great modifications which are brought about in this stage when it does occur. There seems to be no doubt that this great change which is brought about on this type of temperature is a result of the action of the antiseptics upon the typhoid process. When we consider that the amphibolic stage is a result of grave complications such as haemorrhages or perforations, or it may be a recrudescence of the fevers, or anything intervening to change the regular type to this one it is easy to understand
why such a modification should occur.

By this method of treatment complications which are especially a result of the typhoid process—such as perforations, intestinal haemorrhages, epistaxis, etc., are practically done away with at all events when the treatment is begun early. Recrudescences may no doubt occasionally occur but in my experience they are always so modified that it is very difficult to get a proper amphiphilic stage at all. Other complications, too, are undoubtedly modified but whether the salol has a direct influence on them is not a debatable point as yet. It may be that the various complications are influenced favourably and directly by the antiseptic treatment or it may be that the influence is only exerted in an indirect manner in such a way that the treatment modifies or destroys the effect of the typhoid virus thus leaving the body in a filter state to cope with the complications than it would have been had the typhoid poison been left to join with the other complicating condition as it was under the old treatment when cases showing well-marked amphiphilic stages were so frequent and so troublesome.

When cure is to occur defervescence supervenes in the ordinary way but when the result is to be fatal it may occur in either of two ways. We may either have an extreme elevation of the
| Day of Month | Day of Disease | Cent. Fehr AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM | PM |
|-------------|---------------|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Fig. 21     | Fig. 22 Dates of Observations | Fig. 23   |
| 24          | 13             | 30           |
| 25          | 14             | 1             |
| 26          | 15             | 2             |
| 27          | 16             |               |
| 17          | 17             |               |
| 18          | 18             |               |

**Remarks:**

Figs. 21, 22 & 23. To show temperature remaining when fatal result is to occur. Shows that cases are never prolonged under antitoxin and that always occurs from complications.

High

Death
DISEASE: Typhoid Fever.

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**Cent. Fahr.**

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**Pulse per minute:**

| 120 | 120 | 108 | 130 |

**Respirations per minute:**

| Otis Stools | 1 0 | 4 many |

**Remarks:**

Figs. 24 and 24A. To show the prognostic rise of temperature.

Fig. 24 Salol and 25 Non-Salol. 24B. To show death with collapse.
Temperature rising to or exceeding 106° and remaining at this height even in the morning, it is not easy to show examples of this in cases treated antiseptically as we do not so often have a fatal result even when an amphibolic stage occurs. Two fairly well marked examples are shown in figures 21 and 22 both fatal while another pretty well marked example is shown in figure 23 which was fatal at an early period with a temperature of 105.4. In other cases it happens that the fatal result is brought about with a sudden and profound fall of temperature with collapse. I have no chart to show this in a case treated antiseptically. Sometimes this fall occurs just immediately before death but that is not common. A much more common result is to have the temperature running away up just immediately before death and it may attain to a very great height, rising more rapidly as death is more near. A rise of a whole degree may occur within a single hour in such cases and when death occurs the temperature is generally above 106° and even above 107°. Cases such as this are not at all easy to get when using the salol treatment and I have only one case — figure 24 — where it is shown in a noticeable degree, where death occurred with a temperature of 105.6° when the temperature was taken in the evening between 8 and 9 0'clock it was 101.4° and just before the fatal result at
12.15 midnight the temperature had reached 10.5°, thus rising 2.4 degrees in some 3 hours.

Critical Perturbation. - It sometimes happens that defervescence is preceded by an exacerbation which Wunderlich first described as a critical perturbation. It generally occurs on the day or evening before defervescence sets in and though it may look alarming is of no importance.

Defervescence. - This, the period of decline or of descending oscillations may occur in either of two ways, either abruptly by crisis or gradually by lysis. Defervescence by crisis is rare while that by lysis is the general rule but I am inclined to the belief that crisis is rather commoner under the antiseptic method than under the ordinary treatment. In slight cases of typhoid defervescence generally supervenes towards the middle or end of the second week while in grave cases it occurs towards the end of the third week or it may be during the fourth week or even later. Some modification undoubtedly occurs on this period as a result of the salol treatment. I think it can be shown that the antiseptic treatment completely arrests the course of the typhoid process on the 15th day of disease or on the 5th day of treatment in all uncomplicated cases coming under treatment on or before the 10th day and can show this by means of charts and cases.
Fig. 25, 26 and 264. To show the ordinary defervescence by lysis in cases treated antiseptically.
As I have shown above, this treatment practically abolishes a period of stationary oscillations or makes them of little mark and also practically puts an end to the amphibolic stage.

In uncomplicated cases of typhoid the temperature rises gradually to its height in the usual way but when treatment is very early begun it probably does not reach so high as it otherwise would and then begins to fall seldom later than the 5th day of treatment. It may simply show a single peak, reaching its acme and then beginning to fall or there may be two or three peaks but the longer number of peaks—caused by the exacerbations and remissions of temperature—so common with the ordinary treatment are practically unknown. If the temperature does not begin to fall in the usual way we may at once be on the lookout for the supervision of some complication. That defervescence is brought about thus may be readily shown by the charts opposite, figs. 25-26.

The effect is of course more marked in cases coming under the treatment at an early stage.

Defervescence by Crisis.—The abrupt method of defervescence has considerable resemblance to that occurring in pneumonia and if we were only to see the fall of temperature on the chart one might very readily mistake it for a case of pneumonia.

I am persuaded that this mode of defervescence is rather commoner under antiseptic treatment.
Figs. 27 to 31. To show the abrupt defervescence, which not infrequently occurs under the antiseptic treatment.
than under the old method. The duration of this abrupt defervescence varies from 12 to about 36 hours, though it generally occurs within 24 hours. This mode of decline is supposed to occur chiefly in abortive typhoid but is by no means confined to them though it is not common in cases of great severity. Excellent examples of abrupt defervescence are shown in figures 27, 28, 29, 30 and 31 all of which were treated antiseptically.

Defervescence by Lysis - This gradual mode of decline is much the more usual and is very characteristic of this disease. It takes place usually by oscillations - exacerbations and remissions - of a greater or less extent which gradually bring the temperature down to normal. Under the salol treatment the temperature is generally brought down below normal - to between 70 and 80 - and remains subnormal for a varying period - for 10 days or a fortnight - and then rises to normal.

This mode of defervescence takes from 2 or 3 days up to a week or longer depending upon various circumstances. In treating typhoid antiseptically it seems that on the whole the period of defervescence is shortened and takes place with greater regularity than under the old method. In uncomplicated cases when defervescence has commenced it generally progresses much more regularly and is completed in a shorter space of


**Disease:** Typhoid Fever

**Dates of Observations:**

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**Remarks:**

32°N. Salol, and 33°30′ Salol. Showing disappearance by long oscillations. Salol cases delayed owing to the complications.
Fig. 35 and 36. Showing defervescence by pretty long oscillations delayed because treatment late in being begun.
time than under any other method of treatment that I know.

The ordinary types of defervescence are shown in the following charts. Figure 32 is a good example of defervescence by long oscillations in a case treated by the old method. Of cases treated by salol a very good example of this decline by long oscillations is shown in figure 33, and a somewhat similar type is shown in figure 34 where the oscillations are not so profound and progress is more rapid. Other examples are shown in figures 35 and 36 where defervescence takes somewhat longer.

Long oscillations are well shown in figures 37 and 38 both of which were treated by the old method.

Another type of defervescence by lysis occasionally occurs in which we do not have a remittent type with long oscillations but where the remissions are exceedingly slight so that we get a condition resembling the steps of a stair. Such a type is shown in figure 39, which was a case treated by salol and is not a very good example.

A pretty good example is shown in fig. 40, which was a case treated by the old method.

It is difficult to get a really good example of this type in cases treated antiseptically because even when the temperature begins to fall after the manner of this type there nearly always comes in a more extensive drop so that the symmetry of the type is broken. This seems to be due to the
DISEASE. Typhoid Fever.

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**REMARKS.**

Fig. 37.9-19. Showing defervescence by long oscillations in cases treated without antiseptics. Showing the date period at which defervescence sets in in cases uncomplicated.
**Disease:** Typhoid Fever.

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**Pulses per minute:**
108  108  96  96  60  60  96  96  96  96  84  84  84  72

**Respirations per minute:**

**Urine Stools Oxs:**
0  0  1  0  0  0  0  1  0  0  1  0  0  0  1

**Remarks:**
Figs. 39 (Salad) and 40 (Non-salad) To show defervescence by short remissions, tending to form steps.
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<th>Fig. 42.</th>
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**Fig. 42.** To show defervescence by short oscillations (steps) broken by deep remissions. **Fig. 41.** The same: Salol.
fact that the temperature under this treatment is hurried towards normal and does not take such a leisurely descent as with the old method. A pretty good example showing this star-like arrangement, broken in this manner is shown in figure 41 where one or two deeper exacerbations and remissions occur and a similar type is shown in fig. 42. Both treated antiseptically. This type is commoner under the old treatment probably because it took a rather long time to be completed—often 10 and 12 days while the salol never takes so long in uncomplicated and very rarely so long even in complicated cases.

Anomalous Types of Temperature:

**Inverse Type.**—This may occur at any period of the disease and in this type the maximum occurs in the morning and the minimum in the evening. This type is not very common and does not usually last very long at a time—the temperature returning to its normal character in a day or two. It seems to me that this type is specially connected with pulmonary complications. It is not usually considered to have any prognostic significance though in all my cases in which it was well marked a fatal result ensued. I am inclined to regard it as of the utmost gravity.

In one of my cases, that of a man aged 30, who came under observation on the 14th day and who
DISEASE: Typhoid Fever.

Fig. 43. Dates of Observations

Days/Month 4 5 6 7 8 9
Days/Disease 14 15 16 17 18 19

Central Fehr.
died at midnight on the 18th day, as a result of
collapse following a severe haemorrhage which
came on after having received an enema, this type
was exceedingly well marked. He also had right
pneumonia as a complication when he came under
observation (Fig. 43).
In figure 44 we have the chart of a girl aged 13
showing a similar condition and this case also
was followed by a fatal result. The duration of
this case was unknown but when she came under
observation she was suffering from cough which
later developed into pneumonia and there was
also great tenderness in the right iliac region and
over the duodenum.
Figure 45 shows a similar condition which was
the case of a young man aged 16, who came under
observation on the third day and who was suffer-
ing from slight cough with expectoration when
first seen and in whom the temperature began
to fall in the usual way under the salut treat-
ment until pleurisy developed on the 6th day
when the temperature took the inverse type and
a fatal result followed on the early morning of
the 9th day. This patient was exceedingly delirious
with noisy delirium and voided 18 inches of a
tape worm on the 5th day.
In one case I noticed the same condition slightly
marked towards the end of defervescence where
cure resulted. This was the case of a young man
aged 18 who came under observation on the 9th day and who was very delirious on admission with the abdomen greatly distended.

In view of the fact that 3 out of four of these cases were fatal it seems to me that this type ought to be regarded as of unfavourable prognosis and it seems likely that chest complications have something to do with its production.

Intermittent or Periodic Type: Here we have intermittent accessions of temperature in the way usual in malaria which are shown on the chart by apyrexia in the morning followed by an exacerbation in the evening. None of my cases show this type but I saw one case of this kind which Dr. Anderson noted in one of his papers. This was the case of a young man aged 22, admitted on the 10th day, who from the first had severe rigors generally coming on about 11 P.M. Under salol the temperature fell to 99° on the 15th day with the disappearance of all abdominal symptoms and the stools formed. In spite of this the evening rigors with high temperature frequently recurred. This continued for some time till it was discovered that he had recently lakeded from Virginia, U.S.A., where he had probably contracted malaria. On being put upon large doses of quinine the rigors soon ceased and he made a good recovery.
As a rule the periodic type—quidian, tertian or quartan—occurs at the beginning of the disease, but it may occur later and in the decline or may even be present throughout the whole course of the fever. In those cases of typhoid showing at their commencement an intermittent type it generally occurs in countries where malaria is present or in a person who has been in a malarial country. Where this type develops later there occurs on the decline of the typhoid a series of periodic intermittences—with morning apyrexia and even rise of temperature—with or without rigors and lasting for a varying period.

Irregular types. In certain grave forms of typhoid there sometimes occurs a notable irregularity in the course of the temperature. This is especially apt to occur in the grave ataxic forms and is never seen in cases treated antiseptically. I have no salut chart showing this condition but figure 46 shows it in a not very well marked form in a case treated without antiseptics. What generally occurs is that the temperature remains at a very high level for a considerable time—for a week or ten days or longer—and then there is a sudden fall of from one to two degrees or more and this is followed very shortly by a sudden and often marked rise which is generally followed by a fatal result.
Effect of Complications on the Temperature

Intercurrent complications exert a marked influence on the temperature causing marked irregularities on the charts and they either lead to exacerbations or remissions of temperature.

(a) Complications lowering the Temperature.

Haemorrhages generally lead to a fall of temperature. Intestinal haemorrhages generally bring about a sudden and sometimes great fall of temperature but this is not invariably the case as it may rise. Usually when a fall occurs it is followed by an abrupt and high exacerbation which, however, is usually only temporary. When the temperature rises abruptly and rapidly after a haemorrhage and the temperature remains at this high elevation it generally portends a fatal result.

Haemorrhages are very rare in cases treated antiseptically when when they do occur I think it is only in cases which come under treatment later than the 10th day. In my 38 cases there is only a single haemorrhage occurring in a case which came under observation on the 14th day. On the 18th day at 5:30 P.M. he had an enema which was followed in a quarter of an hour by haemorrhage - about 2 pints - which resulted in collapse and death - the evening temperature of 101.4 rising to 103.8 about six hours later, just before
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**Fig. 49.** To show temporary rise after a single haemorrhage (Non-fatal).

**Fig. 50.** To show the effect of repeated haemorrhages—fatal.

Non-fatal.
the fatal result occurred (Fig. 47). Under the old method of treatment haemorrhages were plentiful and I show a few charts to show their effect on the temperature. Figure 48 shows the effect of repeated haemorrhages with cure. Figure 49 shows a single haemorrhage followed by a rise in temperature also resulting in cure. Figure 50 shows a case with repeated haemorrhages followed by a fatal result.

Epistaxis when severe may lead to considerable fall of temperature but as a rule it is little marked in comparison with intestinal haemorrhages. Abortion led to fall of temperature—acting like an intestinal haemorrhage. When these falls occur they are usually though not invariably followed by abrupt and temporary exacerbations. Diarrhoea when very profuse and especially when it comes on rapidly and continues with great frequency brings about a lowering of the temperature with perhaps symptoms of collapse, but the effects on the temperature are not so marked as in the case of a profuse haemorrhage. All danger in this direction from diarrhoea is absolutely abolished as a result of the salol treatment.

Gangrene, sloughs, pyaemia & septicaemia all act in the same way and in any of these cases the fall may be well marked and followed by coldness and all the symptoms of collapse.
Fig. 51 show effect of suppurations on the temperature. 51 Parotitis 52 Otitis.
These troubles are of little account when salol is used as they practically cease to come before us.

(b) Complications raising the Temperature.

The temperature is raised by most of the complications which supervene during the course of typhoid, such as peritonitis, pneumonia, pleurisy, erysipelas, pericarditis, etc., and I will refer to these under the heading of complications.

Peritonitis generally shows itself by elevation of the temperature or by an increased rise.

Suppurations from whatever origin determine a rise of temperature and usually with considerable remissions. There is generally a sudden and sometimes considerable fall when the pus is evacuated, but very often the temperature remains pretty high for some time after the pus has been allowed exit.

Among the suppurations generally occurring in typhoid we find the following:—Peritonitis determines a rise of temperature with oscillations as shown in figure 51, where a considerable fall occurred on the evacuation of the pus; abscesses have the same result as is shown in figure 52, which shows a well marked rise of temperature with considerable oscillations, occurring as a result of suppurative ostitis, and where the temperature went down very gradually with the subsidence of the inflammation; Boils have usually the same result as shown in figure 53 which is that of a case treated without antiseptics. Although that is the general effect of
**DISEASE:** Typhoid Fever.

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**Fig. 53:**

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**Fig. 54:**

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**Fig. 53:** To show the effect of bile. **Fig. 54:** The same—Both non-salt.
boils it is not invariable as I show in figure 54 its chart of a case where large boils were not followed by a rise but rather by a fall.

Both these cases of boils occurred in cases treated by the old method. I have not met any cases of boils in cases treated antiseptically though Dr. Anderson had one such in a case coming late under treatment and where intestinal ulceration was probably far advanced when the treatment was begun.

Errors of diet may raise the temperature at the beginning of convalescence and so may mental emotion of any kind or too much exertion and indeed it takes very little to send the temperature away up at this period.

Marked modifications usually occur in the course of the temperature when typhoid occurs in persons who are already the subject of some other disease—whether acute or chronic—chronic such as phthisis, emphysema, or chronic cardiac or renal disease; acute such as peritonitis, scarlet fever, etc. Changes of various kinds may occur in such cases completely or partially hiding the characteristic typhoid temperature and putting great difficulty in the way of our arriving at a correct diagnosis. The gradual progress of the temperature is quite absent and not infrequently the amphibolic stage is present from the beginning—the oscillations being often well marked with profound remissions.
Age and temperament often exert an appreciable influence in the temperature. In a child the temperature generally soon reaches its height and usually maintains itself at a high level—the morning remission often being not well marked. High fever is generally but is well tolerated.

In patients beyond 40 the temperature as a rule is lower than in those below that age. The temperature often does not show the characteristic form being often interrupted by irregularities and often showing amphibiotic oscillations to a marked degree. In old patients the temperature is apt to be prolonged and collapse temperatures are common.

Diurnal Variations of the Temperature.

In general during the 24 hours there occurs an evening exacerbation and a morning remission which shows the diurnal variation which the temperature undergoes, fluctuating from a maximum to a minimum.

The lowest point of the remission generally falls between 6 and 8 o'clock in the morning but may occur a little earlier or a little later.

In grave cases this remission is usually slight and when it has fallen the temperature only remains at this lowest point only a very short time—it may be only a few minutes—and rapidly and abruptly rises again. When the case begins to improve or in cases which are not so grave the remission is more marked and the
ascension does not occur so abruptly. When the minimum point has been reached and the temperature begins to rise again this ascension may occur in various ways. It may as we have seen above run away up towards the maximum point abruptly, while in other cases the rise takes place much more gradually. It sometimes happens when the lowest point has been reached that the temperature at first begins to ascend abruptly and then rises more slowly towards the maximum or the case may be reversed; the temperature rising slowly and gradually at first and then when it has reached to a considerable height rapidly and abruptly attains its maximum.

In the graver cases there seems to be as a rule only a single maximum and when this point has been reached the temperature remains there for a long time at this high level and it is this fact which constitutes one of the gravest dangers of high temperature.

In other cases, however, instead of the temperature remaining a long time at this single maximum point, we have a series of maximum and minimum points throughout the 24 hours. This may occur in grave cases somewhat late in the course of the disease or it may occur in cases with the long continued single maximum when the illness begins to improve.
When defervescence sets in we have the reverse of what has been described above. We have then usually a single maximum point but now instead of the temperature remaining only at a very short time at the minimum point it remains a very short time at its maximum after which it gradually falls towards its lowest point.

All these types and conditions are modified by the antiseptic treatment—because generally speaking the whole course of the temperature is both shorter and kept lower. In the cases described above the effect of the antiseptic treatment is to make the minimum point of the remission lower, keep the temperature longer at this point and let it rise to the maximum more gradually and when the maximum has been attained the effect is, instead of allowing the temperature to remain a long time at this high point, to bring the temperature sooner and more abruptly towards its minimum.

Even the severe cases when they come under observation early have the temperature favourably modified and in cases where under the old treatment we would have expected a long and continued high temperature, we find that this rarely occurs, the salol treatment having the effect of changing the temperature from the continuous to the remittent type which fact is of the greatest importance when we
remember that the principal danger from high temperature is due to its being, continued and without remissions.

Instead of the temperature in grave cases tending to remain a long time at its maximum and a short time at its minimum, the effect of treatment is to keep the temperature along time at its minimum and only a short time at its maximum, or in other words we tend to get here the condition which, under the old treatment was only brought about on the establishment of defervescence.

**Effect of Temperature on Prognosis.**

Speaking generally the higher the temperature the graver is the prognosis and this is especially the case if the high temperature is long and continuously maintained. A very high temperature with considerable remissions does not imply the same gravity as a high temperature with slight remissions. Where the temperature oscillates between 102° and 104° the prognosis may be comparatively favourable while above 104°F. the gravity increases very rapidly.

Among my 38 cases three only had a temperature reaching or exceeding 105° and one of them was the case fatal from collapse following haemorrhage and the high temperature here of 105·6 was simply the pro-agonistic rise. In another case the temperature reached 105·2°F. on the
day after treatment was begun but after this day it never exceeded 104.2°, the high temperature being quite controlled by the treatment. In the third case the temperature was 105° the morning after coming under observation but it began gradually to fall giving no trouble.
In eight cases the temperature reached or exceeded 104° but did not exceed 105°. In 2 of these cases the temperature was 104° or above at the time of being put under treatment and went down gradually and regularly and without delay, causing no anxiety. In one case the rise of temperature to 104.4° was due to the supervention of a suppurative stis and the temperature fell gradually on the pus getting exit, while in one case a rise to 104.2° occurred as a result of acute parotitis going on to abscess formation.
In one case the temperature reached 104° on the 4th and 5th day of treatment but did not again attain this height though at this point pneumonia supervened with a fatal result. There was cough present when this case came under observation and this chart (figure 14) shows very well the beginning of the fall of temperature due to the treatment along with its subsequent rise owing to the development of further complications. The date of commencement of the illness was not known but this was a case of great gravity from the commencement with excessive abdominal pain,
**Disease:** Typhoid Fever

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**Respirations per minute:**

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**Remarks:**

Fig. 55 (non-salol) to show rise of temperature on taking food. Fig. 56 (salol) not a good example but tending to hyperpyretic form.
vomiting and hiccup. Probably here intestinal ulceration was far advanced causing the abdominal pain and peritonitis.

Figure 55 shows very a case in which the temperature remained at 103.8° in the evening for the first 3 days of treatment and on the next two nights remained at 102.8° and apparently the usual favourable result was to occur when on the two following nights — the 6th and 7th of treatment — the temperature rose to 104°, to fall afterwards in the usual way. Apparently this deviation from the usual result of a permanent fall on the 5th day of treatment was due to error of diet as there were 2 stools on the one day and 4 on the next, four of the stools being loose and mixed with curdled milk. That is the only uncomplicated case I have in which the temperature has not fallen by the 5th day of treatment.

When a temperature of 104° or above is present even if a favourable result should occur under the old treatment one had every reason to expect a slow and troublesome convalescence. Under the salol treatment I think these charts show very clearly that the highest temperatures are readily brought under control and there is never the same laborious convalescence as was formerly so common.

When the temperature reaches 105° and upwards the chances of recovery become much less and a
case with a temperature over 106° seldom recovers. Not the least of the advantages of the antiseptic treatment is the fact that we seldom or never have these very high temperatures of developing after the patient is brought under the influence of antiseptics and when cases come under observation with a very high temperature it is promptly reduced till it is within safe and moderate bounds. In only three of my cases did the temperature reach or exceed 105° and as I have explained, this high temperature was simply the pro-agonistic rise and in the third case the temperature of 105° was present when the patient came under observation, but the temperature at once began to fall and gave no further trouble.

I have not seen a case treated antiseptically where the temperature exceeded 105° except these two pro-agonistic rises and it is not often that it reaches 105° under this treatment. Occasionally but rarely cases with a temperature over 106° have recovered but under this treatment I believe cases with such a very high temperature cease to exist.

General Effect of the Antiseptic Treatment on the Temperature.

To sum up - In a general way the whole course of the temperature is modified in a favourable way so that patients coming under
observation at an early period—on or before the 10th day—in uncomplicated cases, the temperature falls to normal on the 15th day of illness or rather below normal for it generally remains subnormal for from 7 to 14 days and then gradually resumes the normal course. The temperature, however, high is quickly brought within moderate and safe bounds if it was very high when the treatment was begun and the very high temperatures which previously were so common and so alarming and which were so difficult to treat are I believe a thing of the past. Of course in cases coming very late under treatment or in cases developing complications high temperatures may occur but as I have already indicated a temperature of 105° is quite exceptional.

In looking at the results of antiseptic it is important to keep in view the difference between the cases coming under treatment without complications on or before the 10th day and those in whom treatment is begun after the 10th day or in whom complications are present.
Clinical Types: There are many clinical types described. Taking as a standard a case of medium severity occurring in an adult with recovery as a result we can describe many varieties of this general type which may be called an ordinary or average case. This general type of case may be modified in various ways as, e.g., where some special symptom gives the type a special character as where head symptoms predominate, or chest symptoms or abdominal symptoms. Again, it may be that some pathological condition may have been present before the fever breaks out or after the fever has been established thus modifying the type or it may be that some physiological state—e.g., pregnancy—or peculiar temperament or age, sex, climate, etc., may modify this general or average type in some special direction.

The Ordinary or Average Case of Typhoid: It will be convenient first to describe an average case of typhoid of which many divisions have been devised but I will not go beyond the clinical description. In many ways looking at the disease from the point of view of the value and efficacy of the salol treatment the clinical description generally adopted in Germany is of the utmost importance though it does not lend itself so well to a detailed clinical description of this type as the division.
which I will adopt below.

That first division divides the typhoid process simply into two periods: the first period includes the beginning of the disease up to the time when its greatest intensity is reached, and corresponds to the essential typhoid symptoms and the height of the fever. This period under the salol treatment would correspond to the period previous to the typhoid process being subdued by antiseptic, that is to say it would come to an end within 5 days of commencement of treatment or not later than the 15th day of illness in cases coming under treatment one or before the 10th day.

The second period corresponds to the stage when the typhoid process proper has ceased and the period of separation has commenced. This period will commence after the fifth day of the salol treatment when the specific infection has been destroyed and the patient has now simply to recover from the prostration and the debility which the fever has left or from any complication.

This is emphatically the stage where complications are of importance and where under the salol treatment the superadded morbid complications constitute almost the only source of danger. If the patient is treated antiseptically and survives the first period the danger from the typhoid process proper is over and
anxiety will only remain now subject to some complication having been previously present or becoming superadded on the destruction of the typhoid infection.

It will readily be seen that the above division is of the utmost importance as to the result of the salol treatment but it does not lend itself very readily to a detailed account of the various clinical stages of an ordinary case of typhoid and so I will adopt the division generally made use of in Great Britain.

This division divides the course of typhoid into a number of stages, viz., the stages of incubation, invasion, advance, defervescence and convalescence.

**Stage of Incubation.**—The period of incubation extends from the moment the patient has received the infection until the symptoms declare themselves. In many cases it is very difficult to say definitely how long this period has lasted. Thus it may happen that a person has been exposed to the poison for a considerable time and it is impossible to say at what precise moment the poison has been introduced into the body. The poison may be received into the body during a considerable time, but the period of incubation dates from the very first moment at which its reception has taken place.
The length of this period varies greatly but generally speaking it may be put down as lasting from 14 to 21 days though it may be much shorter and may be considerably lengthened—even to 25 or 30 days. Perhaps 14 or 15 days is about the commonest period.

There are no symptoms during this period.

Stage of Invasion. — The period of invasion or beginning betrays itself by the characteristic rise of temperature and other symptoms. It is not unfrequently difficult to say exactly when this stage actually commenced. It comes on so insidiously that the patient is often several days ill before he takes any notice of his condition and he is generally some days ill before he takes to bed.

The period of invasion is therefore held as commencing with the rise of temperature and the disturbed general condition of the patient. He generally feels out of sorts and gradually gets worse. There is not the same difficulty in fixing the beginning of this period when the patient is suddenly taken ill as sometimes happens. This abrupt beginning in my experience is not so very uncommon.

Among my cases nine cases began with shivering and headache but it only one case did the shiver occur as a well-developed rigor; in three cases there was shivering and vomiting; in
three cases there was shivering and pain in the back; in three cases there was sickness and vomiting, while one case (fatal) began with a severe rigor.

In all these cases the beginning was abrupt enough to fix very definitely the commencement. Of the remaining cases it was more difficult to speak so definitely though eleven of them commenced with diarrhea, three with constipation, and two having constipation which was succeeded by profuse diarrhea on taking medicine.

In these cases it would be very difficult to say exactly to a day when the illness commenced, because in most cases the diarrhea would be present or constipation, for a day or two perhaps before it became noticeable to the patient.

However, even in these cases we can come pretty near to the definite commencement. When the illness commences there may be only a single severe rigor as occurred in one case, but more usually there is repeated shivering. The patient simply feels cold and shivers and feels inclined to sit by the fire. When a single severe rigor occurs I believe that it generally portends a severe case, perhaps because it is a sign the patient is the recipient of a very virulent dose of the poison or because he is peculiarly susceptible of attack. When such a condition occurs the temperature usually rises very rapidly, and the patient soon attains
the next stage. In other cases where the beginning is still noticeable but not so pronounced the period of invasion gradually advances as it does in all cases without definite beginning—the symptoms gradually becoming more severe.

Symptoms:
The temperature rises gradually in the characteristic manner described in the chapter on temperature; while the pulse increases somewhat in frequency but usually remains under 100—indeed this character of the pulse is important and relatively speaking the pulse is slow. The pulse remains full and resistent and is often diastolic. When one has had some experience of typhoid, the pulse gives exceedingly important indications and in doubtful cases the condition of the pulse to an experienced observer is often quite enough to decide the diagnosis.

The alimentary system often shows symptoms of gastric derangement, or rather practically it always does. The tongue is furred but still moist, there is a disagreeable taste in the mouth along with nausea and it may be vomiting. Very often gurgling in the right iliac fossa can be elicited if looked for, with some pain or tenderness on pressure. In severe cases meteorism may be present even at this early stage but in ordinary cases it is commoner later. Constipation may be present though diarrhoea is
the rule and when constipation is present it is generally soon replaced by diarrhoea.

In the haemopoietic system the spleen is generally enlarged at this stage and epistaxis is very common.

In the respiratory system cough is very often present at the beginning with wheezing over the whole or part of the chest. In a good many of these cases there is little or no expectoration. Nervous system - During this period there is nearly always headache and the patient feels dull and stupid, has a greater or less degree of prostration. He may have vertigo on sitting down or standing up, with noises in the ears and other disorders of the special senses.

In the locomotor system not unfrequently there are pains in the joints, simulating acute rheumatism, or there may be pains in the back, etc.

Duration - The period of invasion lasts about a week — from five to seven and even up to ten days — and the characteristic eruption may begin to appear in the last days of this stage though it is more usual to observe the spots in the beginning of the next stage.

The effect of the antiseptic treatment is to shorten this stage and especially when the treatment is begun very early. The temperature quickly reaches its highest point — that is the temperature is stopped rising to what would have been its
highest point and so the stage is shortened and the temperature kept lower. Of course this can only occur when the treatment is begun very early. In analysing the whole of my 38 cases the effect of treatment was as follows: – In 10 cases the temperature began to fall on the morning following the day on which treatment was begun; in 21 cases the fall commenced on the third morning (i.e. within 48 hours), while in only seven cases was the beginning of the fall delayed till 60 hours after the commencement of treatment. These figures are taking the cases collectively — those with as well as those without complications when the treatment was commenced, showing that the specific poison is acted on from the very beginning of treatment. In some cases the temperature went up again on the development of complications but in general the favourable progress was sure and rapid.

By modifying this stage it is readily seen that it must modify the whole course of temperature and along with this favourable action on the temperature there is a corresponding mitigation of all the other symptoms.

Stage of Advance: – This stage lasts from 7 to 14 days or longer and is the period during which the characteristic eruption appears. During this stage the temperature is high and remains at a high level throughout.
The general condition of the patient becomes much worse, prostration becomes more pronounced, headache becomes lessened or disappears but all the other nervous symptoms become more pronounced, with the development of the typhoid facies, stupor, subsultus, carphology, and in practically all cases delirium is present to a greater or less extent. The patient now begins to become emaciated, the abdominal pain becomes more pronounced, meteorism becomes developed or if already present becomes more marked; diarrhoea increases, the stools becoming more foetid and in too many cases involuntary, while the bladder may become paralysed requiring the use of the catheter. As a rule the skin still remains dry and burning though occasionally slight perspiration may occur about the time of the morning remissions.

When all the symptoms of this stage are grouped together we have developed the typhoid state which is of such alarming character in so many instances. The above picture is the case as it too often occurred under the old method of treatment but there is no stage of typhoid where the good effects of antisepsis are more marked than in the stage of advance.

Effect of Antiseptic Treatment: As I have endeavoured to show when describing the previous stage, the temperature in all my
cases had begun to fall by the third day of treat-
ment showing that the typhoid poison was al-
ready being overcome and also that this fall was
gradual and progressive in all cases except
where complications afterwards supervened thus
entailing a second rise of temperature. It is thus
apparent that the stage of advance must be
considerably shortened seeing that we no long-
er have the continued high temperature which
was so characteristic of this stage and which
became so alarming in its nature when long
continued constituting one of the great dangers
of typhoid not alone from the hyperpyrexia
which might occur but from the parenchy-
matous degeneration to which every organ of the
body is liable when long subjected to a contin-
uous high temperature. Along with this mod-
ification of the temperature the whole general
condition of the patient is improved so that in
no case treated antiseptically have I ever seen
it assume the alarming characters which I
have so often seen even in uncomplicated
cases treated by the old expectant method.
Even in the very severe and complicated cases
where the temperature has tended to remain
high though beginning to be lowered there is
always the tendency of the continuous to be
modified into the remittent type and the im-
portance of this will be acknowledged when it
is remembered that the great danger of a high temperature is no so much from a very high temperature with remissions of considerable extent as from a very high temperature where remissions are very slight or almost absent.

This method of treatment, of course, does not abolish all dangers usually present in this stage but they are all favourably modified.

Thus it is to be noted when treatment is begun early that the mouth, lips and tongue do not assume the dry, dry, condition to such an extent as usual to be so common in severe cases; prostration never becomes so pronounced, stupor and coma are present in a slighter degree, subsultus was only once present and that was in a case coming late under observation. Delirium was present in 26 cases at some period but it was only severe in some cases with complications or coming late under observation.

Diarrhoea is altogether done away with and the stools become formed and odourless, while almost, from the first day of treatment the skin becomes moist and perspiring.

In cases coming under observation after this stage is well advanced and even with the typhoid state established the same favourable influence is seen — the temperature at the end of five days of treatment subsides and along with this we have all the symptoms
due to the typhoid poison improving in the most marked way. In these late cases the temperature is later in reaching normal and complications may still keep it up after the typhoid poison proper has been subdued.

Stage of Defervescence. — This stage begins generally during the third week or later or it may be towards the end of the second week. The date of this period can under the influence of the antiseptic treatment now be definitely fixed for in practically all cases coming under observation without complications on or before the 10th day of disease, this stage is over and convalescence becomes established on the 15th day of the disease or the 5th day of treatment.

Defervescence may occur either by crisis which is rare or by lysis which is the usual form. I have already shown that I am of opinion that an abrupt defervescence is more liable to occur in cases coming early under the influence of antisepsis than under the old method.

When defervescence occurs by crisis the temperature falls to normal in from 12 to 48 hours and along with the fall of temperature there occurs a complete transformation in the condition of the patient. The tongue rapidly becomes moist and clean, the sordes on teeth and lips disappear, the delirium, the dilatation of the
pupils, trembling and other nervous symptoms cease and the patient becomes perfectly conscious. The pulse falls to normal or below, the tenderness in the ileo-caecal region disappears and even deep gastric pressure and grip of the intestines evince no sign of tenderness, thereby showing that the acute congestion of the intestinal glands has ceased; the typhoid diarrhoea, which is often so severe, offensive and dangerous is quite subdued and the stools harmless. There is no subsequent diarrhoea nor any sign or symptom of ulceration of the bowel and excepting the weakness necessarily following upon so many days of high temperature, the patients are quite well and ready to take food. This is the picture as we find it always on the 15th day of disease in uncomplicated cases under treatment on or before the 10th day but when defervescence occurs by crisis we find the patient in a similar state as soon as the temperature has fallen. Defervescence by lysis is much the more common method of decline and as in the cases terminating by crisis the general condition of the patient undergoes a marvellous improvement with the fall of the temperature. When the temperature falls and the symptoms subside the patient often falls into a sound sleep and on waking he begins to move about in his bed and take an interest in what is going on around him.
Duration of Typhoid.—The duration of an ordinary case of typhoid varies considerably in different cases. It very rarely lasts less than two weeks and that only in abortive cases while more than two-thirds of cases last longer than three weeks and about one-sixth of cases last longer than a month. Murchison gives the mean duration of 200 cases as 24 days and three-tenths. Græsingcr who used the German division of the fever into two periods gives an average of 17 to 21 days for the first period and for the second period he allowed from 11 to 21 days, thus giving for the whole course of typhoid a total duration varying from 28 to 40 days on the average.

The Effect of Antiseptic Treatment on Duration. As I have so often mentioned, the effect of this is to permanently arrest the typhoid process on the 5th day of treatment and 15th day of disease in uncomplicated cases coming under observation on or before the 10th day of disease. We thus see what an immense saving in time is gained quite apart from the great and favourable modification on the whole course of the disease as well as the avoidance of sequelae.

Among my cases—excluding four fatal cases and 2 relapses—the remaining cases give the following average durations:—

In 8 cases coming under treatment with the date of origin unknown, the average duration
of treatment required to bring the temperature down to normal was 4.1 days.
In 24 cases in which the date of origin was known, the average day of illness on which the temperature came down to normal was 16.38 days and the average day of treatment was 7.2 days. These figures include all cases complicated and uncomplicated.
I have not kept out the 4 fatal cases to improve these figures, but because although in these cases the temperature was begun to fall in only one case did it reach normal before it began to rise for the fatal result.
The average duration of treatment in three of the fatal cases was a little over 3 days - so that the antiseptic method never had a fair chance - the patients being too far gone when it was begun.
In the 4th fatal case the fatal result occurred 20 days after treatment was begun but this case was late in coming under observation and had evidences of severe intestinal complications as well as pneumonia.
These results compare very favourably with the average duration varying from 25 to 40 days under the old treatment.
These are the dates on which the temperature came down to normal and in all cases it remained down - never rising again more than a point or two and in one or two of the graver
cases perhaps reaching 99° on one or two evenings.

Variations from the Ordinary Type.

**Grave Type**: In the grave types we have all the symptoms exaggerated, extreme prostration, very high temperature and quick, weak pulse, coma or delirium very well marked—indeed, all the symptoms of the ordinary type exaggerated and with grave complications. This variety is rare under the antiseptic treatment and I have never seen any cases which could even be compared with some of the terrible cases I have seen under the old method of treatment.

I will now go over a few of the types which are usually described.

**Ambulatory or Latent Typhoid**: In this variety the symptoms are insignificant so that the patient may go about and even attend to his business when the pathological change has become well marked though the clinical symptoms have not appeared. There are several varieties of this type. Thus during a typhoid epidemic cases are met with where there is little more than a more or less severe diarrhoea along with some malaise and general feeling of lassitude, the patient never taking to bed and undoubtedly many of these are mild cases of typhoid.

In some cases the beginning is very insidious, the
patient feels out of sorts, feels depressed with
perhaps some headache, inability to sleep and
perhaps has some diarrhoea. Soon the pulse
undergoes acceleration, the rose spots appear and the
diagnosis becomes apparent. The course of the
temperature varies, sometimes there is very little
fever while at other times it is well marked.
In some cases as above described the patient
goes about during the whole course and cure is
the termination. In another class of cases how-
ever, after from 10 to 12 days a sudden change
occurs and the latent variety passes into one of
the ordinary type.
In a third group of cases, which is the most
important as well as the most numerous and
most dangerous we find the latent variety
progressing so far in the usual way until the
suddenly supervenes some grave complication
which makes the true nature of the illness
apparent. This complication is very often an
intestinal haemorrhage which may be very
severe or it may be peritonitis generally a
result of perforation, or it may be pneumonia
or some other complication. An intestinal haem-
orrhage is the commonest of these complications
which betray the true nature of the illness.

Abortive Typhoid. This type is character-
ized by the short duration
of the illness, the illness being incompletely developed.
This does not mean an attenuated typhoid where the symptoms may be alarming but is a case of typhoid shortened in its evolution and terminating favourably. Cases have been described lasting only 4 or 5 days but most cases last from 7 to 14 days. These cases are generally seen during an epidemic and they commence with all the symptoms of a case of ordinary typhoid when suddenly the process is arrested from the 7th to the 14th day and a rapid defervescence brings about cure. The frequency varies greatly in different epidemics and it is commoner in children.

Clinically, the beginning of the abortive form is usually abrupt and it may begin with one severe rigor or several less marked ones. The temperature may rise very rapidly attaining its maximum by the third day or it may rise more gradually.

During advance, the tongue becomes coated, the appetite fails, diarrhoea is usually present but there may be constipation. Rose spots are usually present, the spleen is generally enlarged, and intestinal haemorrhages or epistaxis may occur. The other symptoms are pretty much the same as in an ordinary case of typhoid: the pulse has the usual characters being accelerated, full, soft, and diastolic and prostration to a greater or less degree is present along with delirium.
Defervescence generally occurs abruptly being often completed within 48 or 60 hours and occasionally a critical polyuria or profuse perspiration may usher in defervescence.

The duration of abortive typhoid varies from 4 or 5 up to 15 or 16 days and abortive cases lasting 8 or 10 days are not uncommon in children. These cases as a rule end in recovery but relapses are rather frequent. A fatal result may occur during the primary attack or during the relapse.

Abortive typhoid and Antiseptics. It is worth while saying a few words here in comparing abortive typhoid with cases treated antiseptically. It seems to me that what occurs in cases treated antiseptically and coming under observation is that for all practical purposes they are turned into abortive cases. The sooner the case comes under treatment the more does it partake of the abortive character and seeing that antisepsis cuts the disease short on the 5th day of treatment and the sooner the treatment is begun the milder is the remainder of the attack because the specific poison has not got such a hold on the body and is therefore more easily destroyed while at the same time the illness is cut short before much prostration has set in, thus leaving the patient in the most favourable condition for making a good recovery.

The limit of duration of abortive cases is
generally put at about 15 or 16 days so that any case coming under antisepsis on or before the 10th day would plainly come under this category. The abortive cases are exposed to secondary complications and infections common to typhoid after defervescence has set in but these rarely occur in cases treated antiseptically where the progress to recovery is generally sure and progressive. **Typhoid Febricula.** This is usually a mild type of typhoid common in some epidemics and rarely lasting beyond 10 or 12 days. It may begin abruptly or insidiously and the temperature is generally high from the commencement and the symptoms of gastric derangement are pronounced from the beginning, such as thick fur on the tongue, mouth sticky with unpleasant taste and loss of appetite, generally considerable thirst and there is usually constipation and great diminution of the urine, It progresses gradually for about a week or longer and then recovery commences gradually or abruptly. **Apyretic Typhoid.** An apyretic form has been described in which the attack is so slight that there is no rise of temperature. There is little more than a feeling of malaise and the true nature of the case is only surmised from their occurrence during an epidemic of typhoid. Some ambulatory cases may be apyretic.
We thus see that typhoid fever may present all degrees of fever from apyrexia up to hyperpyrexia and some cases may have a very decitful appearance.

Gastric Form. - The gastric or biliary form is only a variety of beginning, where biliary symptoms especially predominate, showing themselves by bitter taste in the mouth, yellowish fur on the tongue along with nausea and perhaps vomiting and perhaps slight symptoms of jaundice. This variety occurred in 2 of my cases one of which was complicated by bronchitis and the other with pneumonia and both recovered being cases of average severity.

Inflammatory form is only a peculiar mode of beginning and not a definite form of typhoid. It generally passes into the ataxo-adynamic form. This method of beginning bears some resemblance to inflammatory fever—high temperature, quick and full pulse and great thirst.

Mucous Form. - This form is more common and is sometimes rather trouble-some to treat. It is characterised by white fur on the tongue, clammy feeling in the mouth and glairy mucous stools.

This condition is probably due to intestinal catarrh occurring—perhaps along with catarrh of other mucous membranes—and this
intestinal catarrh may in some cases at all events occur as a result of an extensive typhoid affection of the bowel. This condition is apt to lead to some difficulty in bringing about full antisepsis of the intestinal contents. Among my cases stools mixed with slimy, glairy mucoids were present in 12 cases, two of which were fatal. Only one case was mild, two were of average severity while the other nine were either severe or very severe cases. It probably means that a large surface of the bowel is affected and in an inflamed and irritable condition which makes it more difficult for the antisepctic condition to become fully established as new matter is continually being poured off from the inflamed surface requiring a constant and perhaps increasing supply of the intestinal antisepctic to overcome it—probably requiring in many cases more than the patient is able to tolerate. These are probably the most difficult of all cases as in which to bring about and to maintain complete antisepsis of the intestinal contents and to completely subdue the specific infection.

Ataxo-adynamic or Hyperpyretic Form. This variety is of the utmost gravity and is characterised by excessive elevation of the temperature, great prostration and debility along with
great disturbance of the nervous system. There is extreme prostration, characteristic beatitude of the face, smallness, rapidity and softness of the pulse, often very severe diarrhoea with extreme foetor of the stools. The ataxy is shown especially by nervous disturbance such as delirium, subsultus tendinum, carphology, convulsions and other nervous symptoms. This form used to be described as two varieties - the ataxic and the adynamic - but they are so bound together that they really only form one variety which is generally known as the hyperpyretic form.

The very high temperature is always a very alarming symptom in this variety - generally running between 104.5° and 106.5° and being of a very continuous type - the mean remissions being very slight and of very short duration.

This type is generally characterised by a very sudden commencement with violent headache and delirium from the commencement and not unfrequently initial vomiting.

The hyperpyretic form is of great gravity and this is especially the type in which we find patients suddenly struck down with great violence and a fatal result being rapidly brought about. As a rule cardiac paresis soon comes on and this is generally followed by hypostatic pneumonia.
or the fatal result may occur directly as a result of the hyperpyrexia.

Death often occurs within a few days.

Among my cases I have one example of this form which ended fatally on the supervision of pulmonary complications after the general condition of the patient had begun to show signs of improvement. This was the case of a young man aged 16, in whom the illness began very suddenly with a severe rigor, much vomiting and noisy delirium from the beginning—shouting and struggling and attempting to get out of bed. There was also great abdominal tenderness and a temperature of 103.6 when first seen on the third morning—about 48 hours after the commencement. On the fourth day the temperature went up to 104.6 to fall on the fifth morning to 103.6 at which point it remained till the morning of the sixth day when it fell on the evening of the sixth day to 102° and then assumed the inverse type on the fifth day he passed two stools after having castor oil and enemata, one of the stools containing about 18 inches of a tapeworm. The abdomen was now much distended and the noisy delirium continued, and on the sixth day pleurisy showed itself with a gradual rise of the temperature till death occurred at 1:45 A.M. on the ninth day—the illness thus having lasted 8 days. See figure 56, opposite.
Although a fatal result occurred here this is a very instructive case as showing that antiseptics had already begun to do its work when the pleurisy supervened leading to the fatal result.

Prolonged Typhoid Fever. — It sometimes happens that owing to various causes the duration of typhoid is greatly prolonged — up to 80 or 90 days or longer. The causes of this lengthening are various and may result from the prolongation of any of the stages of the fever. Sometimes it is the stage of invasión, sometimes the period of defervescence that is lengthened but as a rule the lengthening occurs in the period of advance which is prolonged by usually by an amphibolic stage of excessive length.

Sometimes when the prolongation falls in the period of decline it is brought about by a re-cruadescence setting in before defervescence has been completed while all the symptoms increase again and the case progresses in the usual way.

These prolonged forms were common enough under the old method of treatment but under the salol treatment these cases of excessive length never occur.

Thus I have records of cases treated in the old way showing cases varying from 34 to 70 days before the temperature touched normal,
a good many of them being over fifty days, one
case 64 days, one 66 days and one seventy days.
None of these cases treated in the old method
came under treatment late - only one on the 13th
day, one on the 12th day, four on the 11th day all the
others less than 10 days.
Nothing of that sort is ever seen in the anti-
septic treatment even if they come late under
observation. I will give a few of the cases treated
antiseptically showing the longest periods before
the temperature came down to normal. These
were all complicated cases.
(1) Admitted on 6th day, complicated with suppur-
ative otitis - temperature down to normal on
the 24th day of illness.
(2) Treatment begun on 4th day, complicated with
intestinal catarrh, temperature down to
normal on 20th day of illness
(3) Treatment begun on 7th day, complicated with
acute bronchitis, temperature down to normal on
the 21st day.
(4) Treatment begun on 12th day, complicated by right
pneumonia, temperature down to normal 22nd day.
(5) Treatment begun on 9th day, complicated by severe
bronchitis, temperature down to normal 17th day.
(6) Origin uncertain, complicated by pneumonia, died
on 21st day of treatment.
(6) Treatment begun on 16th day, complicated by acute
suppurative parotitis, temperature normal 24th day.
These are the cases with the longest durations of those treated antiseptically and it takes very little consideration to show the vast difference between the lengthy antiseptic as compared with the non-antiseptic cases. The antiseptic cases with longest durations are decidedly shorter than even cases of an average duration when treated by the old method.

Haemorrhagic Typhoid:—This type is very rare. The haemorrhage is especially apt to occur at the beginning—from the 4th to the 10th day usually although it may appear late. The haemorrhages may occur in the form of scattered petechiae or they may be pretty confluent. Along with cutaneous haemorrhages there may be haemorrhages throughout the body—from the mucous membranes, from the nose, mouth, gums, etc., and from the internal organs as the bowels, kidneys, uterus, lungs and from the serous membranes as well as in the cellular and muscular tissues. This variety occurs especially in those who have the haemorrhagic diathesis and especially occurs in debilitated subjects and in those who are suffering from various chronic affections—of lungs, heart, etc. The symptoms of this type are very severe—indeed the haemorrhagic forms belongs especially to very severe cases and is practically always rapidly fatal.

Typhoid Fever in Children:—Typhoid in children is generally or often recognised as infantile remittent fever.
Typhoid is commonest in children from 5 to 10 years of age, is very rare under five and quite exceptional under two. Of my 38 cases, 17 of them were under 14 years of age - 11 of these being females and only six of them males. In analysing them they are distributed as follows: - one female at each of the following ages, 2 years, 3 years, 5 years, 10 years; two females at each of the following ages - 8 years, 11 years; and 3 females aged 13 years. Of the 6 boys, four were 10 years of age, one 11 years and one 12 years.

It seems generally to be believed that boys are more liable than girls but these figures argue in the opposite direction. I do not think that sex has much influence one way or the other.

Clinically the symptoms are pretty much the same as in the adult though some modifications are to be noted - perhaps owing partly to the fact that the anatomical changes which occur in children differ somewhat from those in the adult and partly owing to the age of the patient.

The beginning is usually insidious but may be abrupt, the temperature rapidly attaining its maximum and this rapid commencement seems to me to be commoner in the severer cases - thus in some of my cases coming early under observation I find the following temperatures and the cases grave:

In one girl aged 13, on the evening of the 4th day the temperature was 103.6°; in one boy aged 11, a temperature of 102.8° on the 5th day rising to its maximum of 104.2°
on the 6th day; in another boy aged 14 the evening
temperature of the 5th day was at its maximum of 103°8.
I have also records of 3 cases all females, aged respect-
ively five, eight and eleven years showing their max-
imum temperature on the evening of the 7th day, these
maxima being 104°6, 103°8 and 103°6 respectively.
These will suffice to show that the temperature
in the graver cases often rapidly attains its max-
imum and that the maximum temperature in
children is often considerable. I am inclined to
think that an abrupt commencement is rather
more common.

The temperature is generally high and well tolerated
and in the slighter cases it tends towards the re-
nittent type, while in severer cases it tends to re-
main high, with very slight morning remissions.
In the mild form there is generally a pretty high
temperature along with slight nervous disturbance.

Alimentary system — Vomiting is not infrequent at
the commencement and some look upon this as being the rule in children while
it is the exception in adults. I find that among
14 children under 14 years of age vomiting occurred
in only six cases as far as could be ascertained.
In three of these symptoms it occurred only as an
initial symptom, in one it occurred at the beginning
and also many times throughout the illness, while
in the other two cases it occurred many times through-
out the illness but not at its commencement.
In 21 cases over 124 years of age it occurred 8 times at some period of the illness; in five cases it occurred only at the beginning and in the other 3 both at the beginning and later. This would tend to show that there is little difference between adults and children as regards this symptom. The digestive disturbances are often slight being in many cases confined to loss of appetite with furred tongue and perhaps vomiting. Diarrhoea is often wanting from the beginning and when the salol treatment is used of course it will not occur at all but otherwise diarrhoea may later on replace the preliminary constipation or in some cases constipation may be present throughout the whole course.

Abdominal symptoms as a rule are slight—probably in large measure due to the fact that the infiltration and other pathological changes in the intestinal glands are less marked than in older patients. Tenderness and pain are slight or absent and meteorism may be absent—the abdomen remaining soft and flat. Intestinal haemorrhages are practically unknown in children and when blood is present in the stools it nearly always come from the stomach or the nose.

Circulatory System: The pulse is generally considerably increased in frequency but otherwise there is nothing very special. In very young children it may reach 150 or 160 and it
may even be too fast to allow counting while in older children it runs from 120 to 140.

**Integumentary System.** - Rose spots seem to be absent in a good many cases but when present they often occur early and in a characteristic and well marked form.

**Respiratory System.** - Epistaxis is supposed to be rather rare in children and I have seen among but my antiseptic cases but I have seen a good many previously and the most severe case of epistaxis I ever saw occurred in a boy aged about six suffering from typhoid and where the haemorrhage was so severe that it largely contributed to the fatal result.

**Lobular pneumonia** is common as a complication and not infrequently plays an important part in the fatal termination.

**Nervous System.** - The nervous symptoms are important and especially in the grave cases where they may simulate meningitis and lead to a mistaken diagnosis. In milder cases the nervous symptoms are not very pronounced, and violent delirium with subsultus and carphology are not often seen. Convulsions may occur either general or more usually localised when they may be limited to a single muscle or to a group of muscles so that we may have strabismus, inequality of the pupils, etc.

Typhoid in children may conveniently be divided
into mild and grave forms. In the mild form the child feels pretty well on the whole and sleeps fairly though usually its nights are somewhat troubled and restless. The fever does not last long — the beginning of defervescence under the old treatment being rarely later than the 15th day while abortive cases of 8 to 10 days duration are not uncommon.

Defervescence usually occurs somewhat abruptly — the temperature often falling from 1 to 2 degrees to begin with and then coming down to normal a little more gradually.

Convalescence is usually rapid and the patient soon regains strength.

The grave form has more the appearance of adult typhoid with ataxic, adynamic and nervous symptoms pronounced while chest and other complications are often present.

When defervescence occurs it is often rapid — the temperature suddenly going down to or below normal.

Prognosis — Typhoid is much less grave in children than in adults — the death rate being about 8 or 10%. In very young children death is not uncommon but after the first year and up to 10 years death is rare, but beyond 10 years the gravity increases as the patient approaches puberty.

Death generally occurs on the superinfection of broncho-pneumonic complications or severe nervous complications such as general convulsions.
The only case of death I have under 14 years was that of a girl aged 13 who came under observation with some cough but the date of beginning could not be ascertained. She improved at first but died later on the supervision of pneumonia.

Relapses are described as being more common than in adults and they are more frequent in the mild than in the severe forms. In none of my cases was there a relapse proper though in one or two cases there was a recrudescence— which in all cases set in before the temperature reached normal. During convalescence the child may grow with great rapidity and may even take on a process of excessive growth.

_Typhoid in Old People._ Typhoid is very rare in old people though examples are occasionally met with up to extreme old age. As a general rule typhoid is quite exceptional in persons over 40 years. Among my 38 cases only six were over 30 years, four of these being females and two males, the ages of the females being 31, 33, 38 and 39 respectively while the two males were aged 34 and 35 years respectively.

In old persons the period of invasion is usually very insidious and prolonged but may be more abrupt. The temperature rises gradually and even in very grave cases it may not reach a great height, thus contrasting greatly with the temperature in the case of children. Spots are not infrequently absent
and the splenic enlargement in many cases is not well marked. The pronounced feature, however, in these cases is the prostration which is exceedingly apt to be extreme even in cases which otherwise seem little alarming. There is great depression of the vital powers, with dry, hard and often black tongue which is often tremulous. Muscular tremblings along with delirium and other nervous symptoms are rarely absent.

Defervescence is generally gradual and convalescence is nearly always prolonged and not unfrequently is accompanied by some weakness of mental power or other complication.

The prognosis is grave beyond 40 and death usually occurs on the supervention of some complication such as cardiac failure, bronchitis, pneumonia, etc.

Of 6 of my cases over 30 treated antiseptically there occurred one death in a man aged 34, who came under observation on the 14th day having pneumonia as a complication, subsisting with hiccup and unable to swallow. He died in a state of collapse following a haemorrhage after receiving an enema.

All the other cases recovered, two of them being mild, a male aged 35 and a female aged 33, while the others were all severe cases of ages 31, 38 and 39.

Properly speaking only one or two of these come under the category of old people but I describe them as being the oldest cases I have treated antiseptically. Indeed, speaking quite strictly, only persons beyond
40 ought to be included here because a person is only considered old in this respect when beyond 40.

Antisepsis and Age: Occasionally but not often there is some difficulty in getting children to take the medicine as in one of my cases where there was some difficulty at first but he took it all right after. In a few cases owing to the chlorodyne contained in the mixture nervous symptoms may be exaggerated and it may be necessary to replace the mixture by tindolids though they are not so efficacious.

Old people I think lend themselves very well to the antiseptic treatment because the initial stages being insidious and prolonged we often have an opportunity of putting them under the influence of antisepsis before the typhoid process has reached its full development and we may thus cut it short perhaps rather more satisfactorily than when the process suddenly attains its maximum before the treatment has had time to act.

Typhoid in Pregnancy: Typhoid in pregnant women lays them under a considerable risk of abortion or premature labour. Although that occurs very often still it does not always occur and generally speaking its frequency seems to be that about two thirds of cases have their pregnancy interrupted. It is generally accepted that interruption of pregnancy is more liable to occur the later the period of pregnancy
at which the typhoid supervenes. Although the more advanced stages seem rather to favour abortion, more than the early stages still abortion may occur at any period and especially at the third month. Abortion may occur in typhoid of all degrees of severity, though as a rule the more severe the typhoid the greater is the risk of abortion. Abortion may occur at any period of the fever—from the first week up to the beginning of convalescence. It rarely occurs before the end of the first or beginning of the second week and usually it occurs rather later—during the second or third or even during the fourth week and it has been known to occur during a relapse.

It is not very easy to give a definite opinion as to its effect on prognosis; some have held that abortion exercises a favourable influence on the fever—perhaps from the reduction of temperature which it usually brings about—while others hold that it has little or no influence on the prognosis and others again hold that it entails a grave prognosis and no doubt in many cases considerable risk is to be apprehended. A fatal result may occur directly from the febrile process or as a result of complications which are very liable to occur.

It has been mentioned that abortion determines a fall of temperature and this may be so severe as to lead to a state of profound collapse with a fatal termination. Another complication which is very
apt to go on to a fatal result is acute general peritonitis which may be purulent.

In the great majority of cases the foetus is expelled dead — death probably occurring as a result of infection by the specific poison which in all probability also acts as the determining cause of abortion along with the high temperature.

Among my cases I have only one which has any bearing on this subject. It was that of a woman aged 39, who came under observation on the 12th day of illness having been delivered at full term a week previously of a living female child — labour thus occurring about a week after symptoms of her illness had commenced. This was an undoubted case of typhoid with well marked spots. She was at once put under the influence of salol, the temperature soon began to show its influence and by long remissions the temperature was drawn to normal on the 6th morning of treatment with no subsequent complications.
Relapses in Typhoid. - A relapse is a re-
newed attack of typhoid after convalescence has apparently been established and in order that it may be a relapse the tem-
perature must have been for at least 2 days about normal. It is a new attack appearing after the
apparent cure of the first.
The frequency of relapses varies considerably in differ-
et epidemics — from 1 or 2 up to 10 or 12 per cent.
The cause of a relapse probably lies in a fresh ex-
tension of the typhoid process in the intestinal
glands. While age and sex seem to have little or
no influence it is possible that a chill, getting up
too soon, errors of diet, etc., may have some influence in determining a relapse. The type of fever does not seem to have much influence as it occurs
equally in slight, medium or grave cases but is
specially liable to occur in abortive cases.
The duration of the pyrexial interval between the
two attacks varies considerably but as a rule if a
relapse is to occur it sets in within ten days of
the completion of defervescence. After 10 days have passed there is not much risk of a relapse.
In the only undoubted case I have notes of, the
temperature remained sub-normal for 8 days —
between 70° and 70.4° — and then rose abruptly
reaching the maximum temperature of the relapse
103.8 within 48 hours.
Clinically in a relapse the temperature may rise
very abruptly so as to attain its maximum in a few hours or within 24 or 48 hours as in my case while in other cases the rise is slow and gradual.

Speaking generally the relapse shows pretty much the same characters as the primary attack. The spots generally appear early in from 2 or 3 up to 7 or 8 days and as a rule the spots when present are fewer in number than in the primary attack. Spots seem to be absent in a good many cases during a relapse and no spots could be made out in my case.

The other symptoms are much the same as observed in an ordinary case except that they are usually somewhat modified are milder.

Defervescence may occur rather abruptly and may be completed within 48 hours but as a rule it is gradual and takes several days.

The duration of a relapse varies but as a rule it lasts rather shorter than the primary attack. It seems that in all cases the relapse is milder than the original attack - both in its symptoms and duration.

In my case which came under observation at a late but uncertain date the salol treatment was begun but was stopped before the temperature was down to normal. The temperature, however, went down and remained sub-normal for 8 days and then rose again. This would give 9 days from the omission of the salol till the beginning of the relapse and if any of the typhoid bacilli as was likely had been left
undestroyed this 9 days would represent the period during which they were developing—the stage of incubation. That seems to be the most likely explanation seeing that the case came under treatment late and it is known that when this is the case it is much more difficult to obtain complete antisepsis and it is now known that it is advisable to continue the mixture for at least a day or so after the temperature has come down.

The maximum temperature in this relapse was 103.8° while the maximum temperature of the primary attack was 104°.

In another case which came under observation on the 21st day it had all the appearance of being a relapse. It came under observation with a temperature of 99.8° which on the following day fell to subnormal, this being probably the termination of the primary attack. The temperature then began to rise and went through all the stages of what was apparently a typical attack of typhoid having a maximum temperature of 103.6°.

It occasionally happens that there may be more than one relapse—two, three or more having been observed.

The termination of a relapse is generally favourable but grave cases may occur with a fatal termination either from the gravity of the fever or from some complication such as intestinal haemorrhage or perforation.
Recrudescence in Typhoid. A recrudescence implies a rise of temperature during defervescence with aggravation of the symptoms and without any apparent apyretic interval as in a relapse. Convalescence has not been established here when the rise of temperature occurs.

Among my cases I have only two cases treated by antiseptics showing anything approaching a relapse. Both of these came late and at an uncertain period and both recovered. One was that of a female aged 3 years in whom the temperature reached normal on the morning of the 5th day of treatment but rose again that same evening to 103° and remained between 101° and 102° for 4 days after which it fell to normal.

The other case was that of a female aged 38 years in whom a maximum temperature of 105.4° had fallen to 102.2° on the second morning of treatment and fell again farther to 101.6° the following and then on the 4th evening of treatment it rose to 104.4° and gradually fell to normal 4 days later.

Both these cases came under treatment late, with probably considerable intestinal ulcerations which would explain the occurrence of the recrudescences.
Convalescence in Typhoid.—We consider that convalescence is established when the thermometer has shown a condition of apyrexia for 2 successive days. When the patient enters on convalescence he is greatly emaciated and debilitated, but he rapidly recovers if no complications supervene to hinder his progress.

Alimentary System.—The tongue is moist, generally clean though it may still retain some slight fur towards the base. The appetite returns and this is one of the most important signs of convalescence as well as one of the most troublesome to deal with as it is sometimes very difficult to get patients to keep to their prescribed dietary. Under the salt treatment the tongue becomes moist much sooner than under the old method—usually by the 2nd day of treatment signs of its becoming moist may be discerned at the tip and edges and the appetite often begins to appear very early. In some cases the tongue is longer in becoming clean and this is especially the case where the abdominal symptoms were pronounced where it was hard and distended.

Haemopoietic System.—The patient has all the appearances of and the blood shows all the characters of anaemia. During convalescence a very rapid increase of the blood corpuscles occurs.
Circulatory System.-- The pulse becomes slow, is apt to be irregular and not unfrequently shows diastasis and it very readily becomes accelerated and irregular on the least excitement or exertion. Sometimes there is a very striking disproportion between the temperature and the pulse— the pulse may remain rapid while the temperature is normal or subnormal and this is especially apt to occur in severe cases and where myocarditis has been present. In cases treated antisepically the pulse frequently falls to 60 or even as low as 45 or 50 and this is especially apt to occur when defervescence has been rather abrupt. This slow pulse may continue for several days and during this period it is important to keep the patients quiet and in the recumbent position so as to avoid the risks of syncope which may be induced by attempts to sit up.

Integumentary System.-- Desquamation is said to occur to a slight extent in some cases and especially in children but I cannot say that I have ever definitely seen much of it. The hair may fall out during convalescence and the nails again begin to grow, showing transverse grooves as a result of retarded growth during the illness and the nails may even drop off.

Urinary System.-- Convalescence is occasionally ushered in by a polyuria crisis.
a large quantity of pale urine of low specific gravity being passed. This condition is quite passing.

Reproductive System: With convalescence sexual desire returns and is sometimes very troublesome — erections and nocturnal emissions being not infrequent. In females the menses reappear when they have been suppressed during the acute illness.

Nervous System: Exaggeration of the reflexes is rather common and cutaneous sensibility may be modified. Convalescents often show mental weakness and memory is often impaired at first — especially in old people.

Locomotor System: The patient is very easily tired at first but soon improves and his powers of locomotion return very rapidly when he has been treated antiseptically.

Temperature in Convalescence: Appetency is the rule in convalescence but very often we have a rise of temperature, which is usually quite passing, from improper diet, emotional causes, etc., or it may be when more prolonged the commencement of a relapse. Very often a rise of temperature occurs the first time that solid food is taken but usually this is quite temporary though the diet may require some passing alteration.

Effect of the Salol Treatment on Convalescence: In practically every case treated antiseptically the progress of convalescence was rapid, progressive
and safe, without complication of any sort.

The temperature generally falls below normal — remaining between 70° and 80° for ten days or a fortnight — with sometimes a very slow pulse. The general condition of the patient when convalescence sets in, is most favourable to a good recovery seeing that the patient, however ill is only subjected to the pernicious influence of the typhoid poison during five days in cases early under treatment — the effects of the typhoid poison gradually diminishing from the first day of treatment. When this is compared with the long periods under the old treatment during which the system was under the influence of the typhoid poison it is a matter of no surprise that convalescence should go on uninterruptedly.
Complications in Typhoid.

These complications are exceedingly varied in character and in cause. By far the most important group of complications for my present purpose are those which occur as a direct consequence of the typhoid process—they are in all probability directly caused by the typhoid poison, affecting some special system or organ and so producing additional causes of anxiety to the fever. I will include here also those complications such as haemorrhages, perforations, etc., which are especially the result of the primary localisation of the specific infection. I will consider this group at some length referring the complications to their various systems and will then briefly touch on affections grafted on to the typhoid process, and infectious diseases and typhoid, finally giving briefly the complications of convalescence.

Complications a Result of the Typhoid Process.

It is to be remembered that though for convenience I have grouped all the following under the above heading it is probable that many of them are the result of secondary organisms or of those acting along with the specific poison but undoubtedly a large number of them are due to the typhoid poison alone—they are infective conditions.

Alimentary System—Sore Throats. These are not very uncommon in typhoid and may take almost any character.
Aphthous sore throat is not uncommon in childhood but is not of much importance.

Ulcereated sore throat is more important but is not very common. It generally occurs early—towards the end of the first week and is characterised by the presence of small superficial ulcers, circular or oval in form and occurring especially on the anterior surface of the anterior pillars of the fauces, and may be present on one or on both sides at the same time. This condition is probably a result of the specific poison acting on the lymphoid tissue situated here. It is not dangerous of itself but is especially to occur in grave cases. It generally passes off after lasting for a few days or a week or even longer. In one of my cases the illness began with severe sore throat probably of this variety, which, however, had passed off when he came late under observation.

 GANGRENOUS SORE THROAT is very rare but is of great gravity when it does occur.

Various other conditions of this kind may in the mouth but they are not of much interest.

**Intestinal Haemorrhages.** These used to be not uncommon but I am of opinion that in cases coming early under the antiseptic treatment and before ulceration has taken place, the danger of haemorrhage occurring is practically abolished.
These haemorrhages occur especially as a result of the ulcerative process which takes place in the bowel but probably in some cases slight haemorrhage may occur so as to slightly tinge the stools as a result of the hyperaemia which first occurs. In these cases the haemorrhage is very slight and of course occurs early—during the first week or ten days.

In the vast majority of cases, however, intestinal haemorrhages occur as a result of the ulcerative process eating its way into an arteriole; or it may occur on the separation of a slough as the result of a vessel being left open or imperfectly closed. The slough may from some reason become separated before the haemostatic process has been completed.

The blood as a rule comes from the small intestine.

Intestinal haemorrhage is not confined to cases of any special degree of severity as it may occur in the mildest up to the most severe, but it is most to be feared in the grave cases where the ulceration is extensive. Even in very mild cases it may occur and not unfrequently it has been the first sign declaring the true nature of a case of ambulatory typhoid.

It is rare in children and it seems to be commoner in some epidemics than in others.

It is very rare to find haemorrhage in patients...
treated antiseptically. In all the antiseptic cases—96 in all—which Dr. Anderson included in his statistics he had only one intestinal haemorrhage. This was the case of a patient who was admitted on the 9th day severely ill and with pneumonia as a complication; haemorrhage occurred on the 13th day. Previous to admission she had been severely purged with Epsom salts and castor oil and this no doubt materially contributed to bring about the haemorrhage.

The haemorrhage only occurred once and did not recur although the ulcerations of the bowel by favouring absorption of noxious products led to the formation of a crop of abscesses which was the only case of the kind in the whole list of antiseptic cases.

Among my 38 cases there was only one haemorrhage which, however, ended fatally. This was the case of a man aged 34, who came under observation on the 14th day of illness—in a most grave state, tongue dry, hard and black and unable to protrude it, with constant fumbling with his hands, temperature 103°2, hiccough and with pneumonia as a complication. He improved a little on the following days when he was able to swallow a little again and his general condition was becoming rather better when at 5:30 on the afternoon of the 4th day of treatment he had an enema of soap and water—15 minutes afterwards haemorrhage from the bowels set in—about 2 pints—followed by collapse and death about 6 hours afterwards.
In this case ulceration was undoubtedly far advanced when the patient came under observation. The haemorrhage generally occurs towards the end of the second or during the third week but may be earlier or later. It is commonest during the third week.

Symptoms.—It sometimes happens that the haemorrhage takes place internally—the blood is poured out, collects in the bowel, does not make its appearance externally and the first symptoms may be the occurrence of syncope and collapse and death may very rapidly be brought about.

As a general rule, however, the haemorrhage appears externally and the loss of blood brings about various signs and symptoms.

Sometimes the haemorrhage is in very small amount so as only to tinge or streak the dejections or it may appear in the form of small clots. These clots are sometimes very small and the stools require to be carefully examined to see them in some cases. The discharges may be simply streaked with blood or they may be entirely mixed with blood. When the haemorrhage is extensive, as it often is the blood comes away practically pure—and fints of blood may escape. It may come away gradually or may come away with a great gush without any warning, the blood simply pouring from the patient, saturating the bedding and dropping on to the floor. The blood may come away in its natural state of a bright red colour or it may
be in the form of a thick liquid generally with clots of considerable size, soft in consistence and dark in colour in it. When the haemorrhage is very abundant, the blood may have a disintegrated appearance, while if it has been retained in the bowel for some time it may have the character of a thick dark liquid like pitch or tar.

The effect of the haemorrhage on the general condition of the patient varies with the amount of blood lost. If the haemorrhage is small in amount, the effect on the patient may be slight and even inappreciable, but when an extensive loss of blood has taken place we have all the symptoms which usually present themselves when a large quantity of blood has been lost.

The patient becomes pale and cold, profuse perspiration and noises in the ear occur along with nausea and tendency to vomit and syncope with all the symptoms of profound collapse may very quickly supervene.

The pulse presents the well-known characters which usually occur after a severe haemorrhage. It becomes greatly increased in frequency, the pulse wave is much larger than normal and diastole is often exceedingly well marked.

The temperature as a rule falls suddenly and the greater the loss of blood the greater is the fall as a rule. This fall is in most cases followed by a rapid reascension which may take the temperature
higher than it was before the haemorrhage occurred. This rise, however, is not always permanent and when it falls again it is rather more favourable. When the temperature rises and remains continuously high it is nearly always of grave import and very often foretells a fatal result.

As to the effect of haemorrhage on the course of the disease two very opposite views have been held. one set of authorities holding that intestinal haemorrhage is of the utmost gravity while the other set look upon it as being of much less unfavourable prognosis. In view of my own experience it seems to me that there can be very little doubt as to the gravity of this complication and the greater the amount of blood lost the greater is the danger.

When the haemorrhage is abundant it is usually a sign that the ulcerative process is deep and extensive and in these cases perforation not infrequently takes place subsequently giving rise to peritonitis and a fatal termination.

**Intestinal Perforations**. These perforations occur generally as a result of the ulcerative process in the bowel eating its way outwards but in a few exceptional cases it may occur from without inwards as e.g., where inflammation of the mesenteric glands occurs with adhesion to the bowel, then suppuration occurs and an opening into the bowel results.
Perforations seem to vary much in different epidemics, are exceedingly rare in children but after childhood is past all ages seem to be about equally liable. Various secondary causes may help to assist the ulcerative process in bringing about the perforation, such as errors of diet, meteorism, various efforts on the part of the patient such as vomiting, coughing, defaecation, etc., the administration of enemata or violent purgatives by the mouth. The giving of enemata which is one of the necessary consequences of the antiseptic treatment requires to be carried out with the utmost caution.

Perforation may occur in cases of any degree of severity—from the very mildest up to the most severe and it has not unfrequently happened that a perforation has been the first symptom occurring to show a very mild case of typhoid or as the first symptom of the latent or ambulatory type.

Perforation generally occurs rather late—but may happen at any date. It seldom occurs during the first week and not often during the second, is commonest during the third or fourth week and may occur at any later period and even after convalescence is well established.

Symptoms.—In the general case of perforation of the small intestine the symptoms at the beginning are often of such a nature as
to allow no doubt as to its occurrence. Thus there comes on a general state of great gravity, along with perhaps profuse diarrhoea, excessive meteorism and especially haemorrhage.

In other cases — the latent or ambulatory cases — the patient may be going about in a state of little apparent danger when suddenly he passes without warning into a very alarming condition — acute general peritonitis has supervened. When this sudden perforation sets in the patient often dies within a very short lapse of time — often within 12 to 48 hours.

When peritonitis occurs as a result of perforation it may assume one of two very distinct forms. It may be acute or subacute or it may be almost latent.

The acute or subacute form comes on with great suddenness: the patient is suddenly seized with a sudden very great pain causing him to shriek out in great agony and sometimes there is a rigor; the face becomes pale and shrunken with a peculiar greyish tint, the eyes sunk and the nose thin and sharp. The pain is at first limited to the right iliac region but afterwards becomes more extensive and diffused. Along with this there is generally nausea and vomiting which is generally bilious but in exceptional cases is faecal. Rapid elevation of the temperature occurs, meteorism becomes developed to an alarming
extent and there often occurs suppression of the
evires evacuations and suppression of the urine is
the rule. The abdomen is excessively sensitive and
on the slightest touch or even if anyone approaches
the bed he cries out.
The extremities soon become cold and livid,
collapse rapidly sets in with quickness and small
ness of the pulse. Sometimes the pulse temperature
falls before the fatal event, but elevation is the
general rule.
The second type of peritonitis is not quite so
common but I have met with at least 2 cases both
occurring in young men, one of which I was able
to confirm by my diagnosis by a post mortem examination.
Here the symptoms are very indistinct and may
be quite obscure. Thus it may happen that in a
patient in a state of intense delirium or coma
the symptoms are masked to a greater or lesser extent,
and death may occur without any of the most
characteristic signs of peritonitis except perhaps
alteration of the features, vomiting, small quick
pulse with perhaps hiccup and excessive sensi-
sibility of the abdomen which manifests itself by
contortions on the part of the patient should
you touch the abdomen.
As a rule the whole general condition of the patient
becomes more grave, with elevation of the temper-
ature and acceleration of the pulse and increase of
abdominal pain and distension.
In some cases there may be complete latency and the true state of matters is only revealed post mortem. 

Result: Peritonitis a result of perforation is practically always fatal and death may occur with great rapidity — within a few hours or the patient may last for some days. In one or two very exceptional cases recovery has apparently occurred.

Perforation of caecum and appendix may occur and may give rise to suppurative perityphlitis which may be cured as a result of surgical treatment as I have seen in one case.

Peritonitis — So much has been said on this subject in connection with perforation that it is not necessary to say much here. It may occur as the result of a large number of causes. It may result from perforation from the intestinal lesions or it may occur as a result of direct extension without perforation. It may also arise as a result of lesions of almost any of the abdominal viscera.

When perforation occurs and the intestinal contents pass into the peritoneal cavity, acute general peritonitis follows with almost invariably a fatal result. In some cases, however, localised peritonitis occurs, the matters poured out becoming encapsulated and the perforation closed cure may result. I have seen one case where this was apparently what occurred: apparently perforation occurred with circumscribed peritonitis and the
formation of an abscess as a result. The abscess was opened just above Poupart's ligament and a favourable termination ensued.

When peritonitis occurs as a result of extension from an intestinal lesion without perforation it is generally circumscribed—localised to the affected patches and not of much importance. In other cases, however, where extensive ulceration has taken place, where it has perforated deeply perhaps reaching the peritoneal coat a severe and even a generalised and fatal peritonitis very often occurs.

**Jaundice.** Jaundice is a very rare complication of typhoid and may occur from various causes. In some cases it is slight and passing in character and is then probably of a catarrhal character. A more grave condition, however, is that where the jaundice is apparently the result of the action of the typhoid poison on the liver so that we get a condition somewhat similar to malignant jaundice occurring as a result of acute yellow atrophy. This type occurs somewhat late—generally in the third week. It very often commences with intense rigors and the jaundice becomes exceedingly marked while at the same time the general state of the patient becomes much aggravated. The abdomen becomes greatly swollen and even tympanitic, there is pain in the right hypo-
chondrium which is aggravated on pressure. Haemorrhage from the bowel may occur or from the nose, the prostration increases till a state of profound adynamy exists when delirium generally supervenes and death terminates the process in from 7 to 10 days from the commencement of the icterus.

The post mortem shows a state of the liver resembling what is seen in acute yellow atrophy. Recovery has occasionally occurred in cases which were supposed to be of this grave type. This form of jaundice may occur at any period of the course of typhoid or during convalescence or in a relapse.

In fatal cases the icterus may persist till death or may disappear shortly before the fatal result. In the cases which recover it may pass off in a few days, or may persist throughout the whole course of the fever and even into convalescence. The prognosis is always grave as it is always doubtful.

The Salivary Glands. The submaxillary and sublingual are occasionally affected by inflammation in typhoid. They become hard, indurated and painful and as a result we have arrest of the buccal secretions. It generally occurs rather late—towards the end of the second or during the third week. It may give rise to a good deal of discomfort.
Acute Parotitis. This is much more important, is not very uncommon, and generally goes on to suppuration. It may occur at any period of the fever but generally occurs late—often after defervescence has set in and is not uncommon even after convalescence is well established. In the one case occurring among mine it set in when defervescence was well established, on the 18th day of illness when the patient had been three days under treatment. The temperature went up in 24 hours from 100.4 to 104.2 and afterwards showing considerable remissions and pyaemic symptoms. This complication occurs especially in adynamic cases where there is great prostration and usually it leads to considerable prolongation of the illness. In my case coming under observation on the 15th day it was 9 days before the temperature was down to normal instead of the 5 days usual in the antiseptic treatment but this must be considered very favourable when it is noted that treatment only began on the 13th day. It generally goes on to suppuration and the temperature falls rapidly when the pus is let out. The prognosis is generally rather grave partly from its usually occurring in grave cases and partly owing to the presence of a general pyaemic condition of which it is often only the local expression. These cases are often fatal.
Occasionally it happens that acute parotitis may undergo resolution without suppuration and also recovery may occur after suppuration.

**Haemopoietic System.**

Infarctions of the Spleen may occur but as a rule do not give rise to many or even to any symptoms at all. They are generally to be suspected when the enlargement of the spleen comes on suddenly, late in the disease, with sudden pain and sensibility over the left hypochondrium. Abscess of the Spleen followed by rupture may occur but is seldom made out clinically. It usually results in general peritonitis followed by a fatal termination. Death may result within a few hours after rupture. The rupture is generally associated with sudden great pain, often excessive vomiting and rigors with subsequent development of meteorism and the fatal result generally occurs in a state of syncope or collapse.
Circulatory System.
Pericarditis may occur, but it is exceedingly rare, made out during life. Endocarditis is also rare but may occur. It generally affects the mitral valve but may attack the aortic and rarely the tricuspid. It is seldom made out during life as even when a murmur is present one can rarely be certain of endocarditis because murmurs are often present due to temporary and passing causes.

Myocarditis. Various important changes occur in the circulatory system during typhoid as a result of the condition known as typhoid myocarditis. Cardiac changes are very common and there are probably few cases of typhoid which do not show some cardiac symptoms at some period of the disease; these changes generally being in the direction of cardiac enfeebledness. These cardiac changes are not confined to any special variety of typhoid but are seen in cases of all degrees of severity although the hyperpyretic cases are those which are especially predisposed to grave changes in the cardiac muscle which may lead to syncope and death as a consequence sometimes with the most awful suddenness.

The symptoms resulting from these cardiac changes generally advance insidiously and one can never say at what exact moment the changes begin.
During the stage of invasion the cardiac contractions generally show little alteration from the normal, being strong and regular and the apex beat in its normal position, the radial pulse being full and strong but often showing well marked diastolism. Towards the end of this stage or at the beginning of the stage of advance the cardiac contractions may begin to show signs of enfeeblement. The apex beat is still in its normal position and in mild cases it is still strong and vigorous but in severe cases feebleness may now be becoming well marked as shown by diminution of the apex beat with perhaps some irregularity while the radial pulse is tending to become softer and more compressible. If the diastolism still more marked. The first sound is becoming feeble and may be heard with difficulty while the second sound may show signs of impurity and may be reduplicated. Murmurs may make their appearance - generally systolic murmurs with their point of maximum intensity at the apex. These murmurs are generally soft in character and rarely take a loud and harsh character. The second sound may retain its normal characters throughout the whole course of the illness.

As the fever progresses the cardiac symptoms continue to show increasing enfeeblement of the cardiac muscle. The apex beat becomes much diminished may be replaced by a vague undulation and in
grave cases it may be absent altogether both to
inspection and palpation. The first sound be-
comes more muffled and faint and may dis-
appear while the reduplication of the second
sound becomes more pronounced as the sound it-
self becomes weaker and the second sound, too,
may become very faint and even be absent.
The murmurs vary from time to time with the
condition of the patient and practically all the
sounds and murmurs may disappear when the
condition is at its height just before the onset of
collapse. The radial pulse becomes weaker and
weaker and more and more compressible and
rapid and a fatal result may occur now at any
moment and with great suddenness.
Instead, however, if the case ending fatally a
change for the better, set in about the end of
the third week; the pulse begins to improve, it
becomes slower, more regular and less compressible;
the murmurs disappear and the first sound
soon acquires its normal characters while the
reduplication of the second sound if it existed
passes away.
The circulatory system returns to normal very
slowly. The profound alteration which has
occurred in the myocardium is long in being
entirely recovered from as is shown by the tendency
to fainting and syncope which may remain after
and convalescence has begun of which the readiness
of the pulse to become accelerated on the least excitement is in part at least a manifestation that the cardiac muscle has not regained its normal condition.

Recovery, however, does not always occur and we may have a fatal result brought about in what is perhaps the most alarming of all the modes of death in typhoid — sudden death.

Towards the end of the third or beginning of the fourth week instead of things beginning to improve the pulse becomes more and more rapid and compressible and may be so small as scarcely to be felt and syncope and collapse may supervene with sudden death.

In these cases where grave alteration of the myocardium is present this syncope is not uncommon and may at once bring about a fatal result at the first attack or the patient may regain consciousness only to pass into a second or even a third attack before the fatal result occurs.

Sometimes the state of collapse may pass off after lasting a short time and the patient may gradually begin to recover but it is rare that recovery occurs when a second or a third attack of syncope has occurred. The patient shows all the symptoms of intense collapse — becomes cold and covered with clammy sweat, the surface becomes blue and discoloured, the eyes sunk and the cheeks hollowed, the temperature falls abruptly and often
to a very low point but generally runs away up before the fatal result. In exceptional cases instead of the temperature falling it rises still further and this is of still graver import.

These changes in the myocardium and consequent cardiac enfeeblement are an important agent in bringing about or assisting the tendency to pulmonary engorgement which so often results in post-static pneumonia and pulmonary edema as troublesome factors in the fatal termination in so many cases.

The effect of the antiseptic treatment is that we never get these extreme degrees of changes in the cardiac muscle and when we remember that these changes are brought about by the prolonged high temperature acting along with the specific typhoid poison upon the cardiac muscle the explanation is readily found. The antiseptic treatment by destroying the specific poison and reducing the temperature removes very largely the causes of the typhoid myocarditis.

The Arteries:

Emboli are not very uncommon complications in cases deeply affected by myocarditis. When the cardiac muscle is greatly enfeebled clots are apt to form in the heart and pieces of these breaking off and being carried into the general circulation give rise to emboli. They are generally multiple and may be distributed to any part of the arterial
system and generally several arteries are affected simultaneously or one after another. These emboli give rise to the same symptoms and consequences as when they occur in other diseases and need not be dwelt upon here.

**Typhoid Arteritis** Arteritis may occur in typhoid fever and may affect any of the arteries—small, medium, or large. It may take the form of endarteritis, mesarteritis, or periarteritis, or more usually all three are more or less combined. It is a true typhoid arteritis, a result of the action of the typhoid poison. The process leads to narrowing or to complete obliteration of the lumen of the vessel and to the arrest of the circulation in the area of its distribution. It is especially apt to attack the arteries of the inferior extremities and especially the posterior tibial. But other vessels may be affected at the same time though generally to a lesser degree.

When complete obliteration occurs, it generally leads to gangrene in the affected area. The process generally shows itself late and occurs especially in grave cases.

Clinically, when arteritis sets in, it shows itself by a sudden, more or less acute pain in the line of the affected vessel, which is increased on movement or pressure. The pulse in the distal area is diminished or even suppressed while swelling of the affected part may occur and the line of the
artery shows itself in the form of a hard cord. When the obliteration is incomplete recovery may result, but when complete obliteration occurs the usual result is gangrene—wet or dry. I have only seen one case of gangrene and that in the case of an old patient treated in the old way where the toes and part of one foot were affected by dry gangrene.

The Veins.

_Phlebitis_ or _Phlegmasia Alba Dolens_ is very uncommon. As a rule, typhoid phlebitis attacks the veins of the lower extremities rarely the veins of other localities. It is a rare complication and seems always to occur when some purulent condition is present and is usually unilateral especially affecting the left crural vein. It is apt to occur late and especially in convalescence. _Thrombosis_ generally comes on abruptly with sudden sharp pain and rise of temperature, quickening of the pulse and general febrile disturbance while locally there is swelling of the affected limb with perhaps slight redness. It may recover altogether & cure often occurs rapidly in a week or two but may be much longer & it may leave rather trouble-some sequelae, such as edema, varices, etc. & rarely gangrene which is generally moist. Like all cases of thrombosis a fatal result may occur as a result of the formation of emboli, especially pulmonary which are rapidly fatal.
Respiratory System.

Epistaxis is a very common occurrence or used to be in my experience. Nothing struck me more than the difference in this respect between cases treated antiseptically and those which I have seen treated in the old way. I used to be struck with the great frequency of this accident, especially in children and I remember during one epidemic of typhoid in connection with milk contamination where out of 50 or 60 patients a very large proportion suffered from epistaxis while not a single case occurred among my cases treated antiseptically. I do not think that Dr. Anderson in the cases he published mentioned any case of epistaxis and I saw many of his cases treated and do not recollect seeing any such accidents.

Epistaxis may occur at any time, it may occur very early from the first day and may occur once only or may recur several times and the amount of blood lost may vary from a mere trace up to a very large quantity. When the haemorrhage is extensive it generally brings about a noticeable lowering of the temperature which, however, is generally very temporary. Some have thought that an epistaxis was of favourable omen and I suppose if the amount of blood lost is very small it may not exert any unfavourable influence on the course of the fever.
and may even in some cases through the reduction of temperature produce some amelioration of the general condition of the patient, but I have seen several cases where after a pretty considerable loss of blood the general condition of the patients was much aggravated and in the case of one young boy profuse and persistent epistaxis was undoubtedly an important factor in contributing to a fatal result.

The Larynx.

The larynx is affected with considerable frequency in typhoid and such complications may vary from the slightest catarhal condition up to one of the most grave of all complications of typhoid, viz., ulceration with necrosis of the cartilages and complete disorganisation of the larynx.

Catarhal laryngitis is very often found post mortem even if symptoms do not show themselves during life. During life it generally shows itself only by slight hoarseness with perhaps some cough.

Membranous laryngitis may also occur and in this condition the mucous membrane is covered by a false membrane. It is rare and is not of much importance.

Ulcerative laryngitis generally begins in the lymphatic follicles about the base of the epiglottis, in the arytenoid region and about the posterior insertions of the vocal cords. The lymph follicles in these situations undergo infiltration and swelling
and swelling which may undergo resolution or may go on to ulceration which may be of varying extent. It is generally associated with a similar condition of the pharynx. It may be confined to the epiglottis, especially about its base and this variety is generally superficial and does not lead to any very grave consequences. In exceptional cases only the cartilage of the epiglottis is affected.

As a rule during life this variety does not betray itself by any very pronounced symptoms. There is usually some difficulty in swallowing and this dysphagia may be complete and there may be a greater or less degree of aphonia. Instead, however, of ulceration retaining this comparatively simple form it may undergo extension till it forms a most alarming and generally fatal complication. Luckily this grave condition is exceedingly rare.

It may develop comparatively early in typhoid — towards the end of the second or during the third week — but as a rule it occurs during convalescence. The ulceration generally commences on the posterior wall of the larynx and is generally superficial to begin with. Gradually the ulcerative process extends deeper till the perichondrium becomes affected and lastly it affects the cartilages.

It may subside at any stage or may go on to suppuration when recovery may occur on the evacuation of the pus but generally when suppuration, the laryngeal
cartilages undergo necrosis and separation and the pus and fragments of cartilage may find exit towards the interior of the larynx or externally on the skin surface. This condition generally comes on during convalescence but may show symptoms of beginning when the fever is at its height while in some cases it comes on long after the patient has apparently recovered his usual health.

Generally a fatal result is brought about by the superintervention of oedema glottidis but other complications may ensue which helps to bring about the fatal result such as gangrene of the larynx or of the lung or pulmonary abscess or pneumonia.

Very often there are no symptoms until oedema glottidis supervenes often with a rapidly fatal result but in other cases it may show itself in an increased gravity of the patient's general condition, elevation of the temperature, quickening of the pulse, etc., along with perhaps local signs of the inflammatory condition with pain, cough, dyspnoea, etc.

It is practically always fatal.

**The Bronchi:**

Bronchitis is nearly always present in typhoid at some stage and generally it comes on early during the first week. In many cases it is very slight, showing itself perhaps only by a slight cough with some frothy sputum but in other cases it may be and often is a most serious complication and it not unfrequently happens that
later we have developing a pneumonia which com-

bination makes for a grave prognosis.

The Lungs—There are not many cases of typhoid

which do not show some pulmonary

changes throughout their course and very many

cases owe their fatal termination to lung complications.

Acute congestion is often present, generally as a pre-

liminary to pneumonia or bron-

chitis and the symptoms of congestion are generally

mixed up with symptoms of the accompanying
diseases. Occasionally it causes extreme dyspnoea.

Pulmonary oedema is often an accompaniment

of hypostatic pneumonia but

sometimes occurs in a very acute form when the

heart is in a very weak condition and especially

if the lungs are in any way affected by some

chronic pulmonary trouble. When this acute

oedema supervenes the symptoms rapidly become

threatening, the whole chest may become filled

with fine crepitations, great dyspnoea with per-

haps some cough and a fatal result may be

brought about within a few hours from asphyxia.

This acute condition is especially apt to occur when

the kidneys are affected with nephritis.

I have seen one case recover largely I believe owing
to the use of oxygen as an inhalation.

"Hypostatic pneumonia" is generally combined

with the above condition.

The clinical signs of hypostatic congestion which
so often occurs as an important factor in the fatal termination are often somewhat obscure.

This condition especially occurs in grave cases and is especially a late complication—occurring during the 3rd or 4th week. It seems to depend greatly upon the weak condition of the heart which so often occurs in grave cases when the myocardium is affected.

It generally comes on insidiously and in the earliest stages examination of the bases will show fine crepitations to a greater or less extent.

There is usually little or no cough or expectoration.

When the congestion is more extensive, the dyspnoea becomes marked, with cyanosis, lowering of the temperature, smallness of the pulse, quickening of the respirations and crepitations may be heard all over the chest. In an advanced stage it is practically always combined with edema. It is difficult or impossible to say where the one ends and the other begins.

**Lobar Pneumonia**—Pneumonia may occur at any stage of the fever—at the beginning, during the course, during defervescence, or in convalescence.

At the beginning pneumonia may occur in such a way that the pneumonic symptoms mask the symptoms of the typhoid so that at the commencement the true nature of the attack may not be apparent.

In such a case the typhoid symptoms become more pronounced later on and the true nature of the case...
is revealed while in other cases the pneumonia is and remains the dominating condition and the typhoid lesions are only discovered at the post mortem. In some cases both affections strike about equally at first and progress together. The commonest type is where the pneumonia is at first the principal symptom giving way later to the more pronounced typhoid symptoms.

This initial form of pneumonia is rare and its actual form is still a matter of contention. Some hold that it is a simple pneumonia superadded to the typhoid process while others hold that it is a special form of pneumonia—a direct result of the typhoid poison acting upon the lungs. It seems very likely that in some cases at all events it is due to this specific infection.

During the course of typhoid pneumonia is not very rare but it is somewhat rare during convalescence. It is rare during the first week and usually occurs towards the end of the second or during the third week.

The symptoms are seldom or never so marked as in ordinary uncomplicated pneumonia. It seldom begins with a rigor & abrupt elevation of the temperature or with the short cough, pain in the side and the ordinary signs so typical of acute pneumonia. Often there is little more than acceleration of the respiration and rise of temperature as pointing to the lung complication but
the general state of the patient becomes much aggravated and examination of the lungs will generally reveal dulness and the ordinary signs of pneumonia.

As a rule the prognosis is most grave for the pneumonia when supervenes at a time when the patient is very prostrated and the sudden supervention of this grave complication often brings about a fatal result with great rapidity.

**Pneumonia in Cases treated Antiseptically.**

In my 38 cases pneumonia presented itself in 7 cases, one of which came under treatment on the 4th day, one on the 10th day, and five cases after the 10th day.

In the case - a youth of 16 - coming under treatment on the 4th day pneumonia was present when he came under treatment, with dulness over the whole of the right lung and respiration.40. The temperature fell on the third day, going down to normal and rising again on the 12th day of illness when he had some recurrence of chest symptoms but these were very temporary and he made a very rapid recovery.

The case coming under treatment on the 12th day was that of a girl aged 11, who came under observation with dulness over the base of the right lung and other symptoms of pneumonia. The temperature here again fell soon after treatment was commenced and gradually went down and cure was most satisfactory the temperature remaining down
from the 15th day of illness.
In no case in which treatment was begun on or before the 10th did pneumonia subsequently supervene.
As regards the five cases in which treatment was begun later than the 10th day the severity and results were markedly different.

In all these cases there were chest symptoms at the time when they were first seen; in two cases there was some cough with expectoration when first seen, in two there was single and in one case double pneumonia and three of the cases were fatal.

I will briefly give the characteristics of these cases.
In one case that of a young woman aged 24, she came under observation on the 11th day with a temperature of 104ø, very delirious, with tongue dry and black, many rose spots, distension of the abdomen, troublesome cough and dulness over the lower half of the left lung. She also suffered from necrosis of the right tibia. The delirium continued, the tongue remaining very dry and black on the second day of treatment when there was some tendency to become cold without perspiration and salol had to be omitted twice.

In the third day of treatment the tongue shows symptoms of cleaning but she continued restless and delirious and died on the forenoon of the third day of treatment. In this case there was the usual fall of temperature on the second day of
treatment followed by a rise and fall alternately till death occurred. This case was hopeless from the first.

In the second case, a girl aged 18, who came under observation on the 12th day there was temperature of 105°, flushed face, dulness, cough, with abdominal tenderness and many rose spots. The temperature was at once brought under control, falling gradually by considerable oscillations so that on the morning of the 5th day of treatment it was down to 99°. It rose again to 102° on some increase of the chest symptoms and remained about 102° for 3 days when it rapidly fell to normal and remained down on the morning of the 9th day of treatment.

In the third case although pneumonia was present death occurred as a result of intestinal haemorrhage. This was the case of a man aged 34, who came under observation on the 14th day with temperature of 103·4°, tongue dry, hard, black and unable to put it out, nose sharp, pupils dilated, numerous spots, hiccupping twice, with lower half of right lung dull back and front and great wheezing over the whole chest, constant fumbling with his hands and muttering talk, the abdomen tense and distended. On the next day the tongue was beginning to become most but was unable to swallow anything, vomited twice, passed urine in bed twice; the right lung was now dull back and front all over but on the whole
his appearance was rather better, with less fumbling of his hands.

On the third morning his general condition was rather better, swallowing much better, temperature down to 99.8 but the cough was still troublesome with no expectoration.

On the fourth day of treatment the tongue was beginning to clean, was able to move it better and was becoming more conscious but the temperature was again rising, and on the afternoon of this day after an enema of soap and water, haemorrhage about 2 pints from the bowel set in followed by collapse and death in about 6 hours with an ante-mortem temperature of 105.6.

This case was manifestly grave from the first and the marked change for the better which had set in previous to the haemorrhage could probably have been obtained by no other method of treatment.

In the fourth case coming under observation on the 15th day of illness with tongue dry, dirty and cracked, no iliac tenderness, four spots on abdomen, much cough and expectoration, dulness over whole of back of both lungs with great wheezing over the front and respirations 40 per minute; was very delirious and trying to get out of bed and passing urine in bed.

Next day the tongue continued dry and tremulous, passed one stool in bed, cough continued with much expectoration which was partly rusty and some
ileo-caecal tenderness.

On the morning of the third day the temperature was down to 100.2° but gradually began to rise again when acute parotitis developed and on the fourth day of treatment the temperature had again reached 104° at which point it remained till the following day, when it gradually began to fall and rapidly reached normal on the pus being let out.

Here the temperature reached and remained normal 9 days after the treatment was begun showing a most favourable result following a double pneumonia and acute suppurative parotitis with very free discharge of pus and this result was all the more favourable when it is noted that the treatment was begun late — on the 15th day.

The fifth and last of these cases complicated with pneumonia was that of a girl aged 13, the duration of whose illness was unknown but who when first seen had temperature 102.6°, tongue moist, dirty, distinct tenderness over ileo-caecal and duodenal regions and about half a dozen rose spots, and some wheezing over the back with some cough. The temperature went up to 103.2° in the following day while the other symptoms remained much the same except that the abdominal tenderness was more marked. Temperature was down on second morning of treatment to 100.2° but on the following day began gradually to rise again with increase of abdominal pain and troublesome cough with no
expectoration. The temperature reached 104.6° on the 6th evening of treatment, then fell again to 101° and oscillated between 101° and 103° till pneumonia definitely showed itself on the 11th day of treatment. The temperature still remained up though distinctly lower, showing one or two very large remissions to below normal in the evening and rising in the morning to between 102° and 103° this showing the inverse type of temperature just before the fatal result occurred.

These results undoubtedly show that pneumonia rarely shows itself later when an uncomplicated case comes under treatment before the 10th day. It also shows the much greater danger in case of patients coming under observation later than the 10th day — these having not only a much greater chance of already having some complication but an immeasurably greater probability of the subsequent development of pulmonary complication. The very high gravity is also seen when it is noted that out of five cases coming under treatment after the 10th day, with pneumonic complications either at the time or later, we have 3 deaths. These results would tend to show that pneumonia is more dangerous when it comes on late in the progress of the typhoid process than when it declares itself at an earlier period.

Catarrhal Pneumonia is a fairly frequent complication in
typhoid and often enters into the fatal termination in the case of children. It is a late complication, generally comes on insidiously and very often the physical signs appear pretty much those of a general bronchitis but careful percussion will generally show some pneumonic foci— with dulness, tubular breathing, etc.

This condition may give rise to pulmonary abscess or gangrene and in rare cases to bronchiectasis.

**Pulmonary Abscess**—This a rare complication. It may occur as a result of catarhal pneumonia, or as a result of suppuration of a septic infarct, or it may take the still graver form—pyaemic form—in which we find multiple abscesses scattered through the lungs and associated with suppurations in other parts of the body.

**Pulmonary Gangrene**—is not common but used to be not very rare—generally occurring as a result of gangrenous emboli arising in connection with bed sores. It may, however, arise in other ways and especially in connection with catarhal pneumonia foci. It occurs late and is an exceedingly grave complication. It may lead to the formation of pneumothorax. The symptoms are very obscure and may be altogether absent but it may betray itself by frothy sputum, etc.

**The Pleuræ.**

Pleurisy occurring in typhoid is fairly common...
and may be single or doubles, may be dry or there may be effusion and the fluid may be serous, bloody or purulent. **It is rarely serous being generally either purulent or haemorrhagic.** It may appear at any period but is especially an early complication and may begin so as to mask the typhoid at first. It may occur during defervescence & convalescence. The symptoms are generally rather obscure and it may betray itself simply by elevation of the temperature, quickening of the pulse and respiration along with serious aggravation of the general condition of the patient. **Feces may be made out if looked for.** It is a grave complication, the gravity being greatly increased when the effusion is purulent. **Among my cases I have one case with pleurisy and it has to some extent been described in the section on hyperpyretic cases.** This was the case of a young man aged 16, who came under observation on the third day with a temperature of 103°. The illness began with a severe rigor, with considerable vomiting and when first seen the tongue was dry and hard, pupils dilated, slight cough and expectoration and he was very delirious and noisy and trying to get out of bed. On the second day of treatment, the tongue continued dry and dirty, abdomen distended and he was very noisy and delirious. On this day he had 2 stools in one of which he passed 18 inches of a tapeworm.
The temperature in this time had risen from 103.6° at the beginning to 104.6° on the second day and fallen to 103.6° on the third and to 102° on the 4th day and at this point pleurisy showed itself with friction and the temperature rose progressively till a fatal result occurred with dry and glazed tongue, abdomen tympanitic and a temperature of 105.4° F.

This was from the beginning a very grave case and probably under the ordinary expectant treatment would rapidly have attained a hyperpyretic condition with fatal result in that way.

With the salol treatment we see how the temperature is at once brought under control and it is only the subsequent development of this grave complication that runs up the temperature and procures a fatal termination.

Pneumothorax is very rare but may occur and especially in connection with pulmonic abscess or gangrene.

It is of great gravity, when it does occur.

Complications of Respiratory System in my cases:—

In 19 cases or exactly one half there were no pulmonary complications whatever or they were so slight that no note was taken of them and 11 of these cases came under treatment on or before the 10th day. In 4 cases the date of origin was uncertain but 2 of these were supposed to have been
ill about 3 weeks while the period of the other 2 was quite unknown. The other cases came under observation on the 11th, 12th, 14th and 17th days respectively.

Of these cases two were very mild, both first seen on the 10th day; three were mild, seen on the 5th and 8th days and one with date of origin uncertain; six cases were of average severity, seen on the 7th, 12th and 14th days and three of them were of uncertain date; eight severe cases came under treatment on the 4th, 6th, 7th, 8th, 11th, 17th, 9th and 5th days respectively, thus showing a large number of severe cases free of chest complications throughout when early under the salol treatment.
Integumentary System:

Scarlatiniform Rash may occur sometimes before the rose spots. It occurs as a slight generalised redness, disappearing on pressure and is quite passing. In some cases it is a very pronounced erythema simulating scarlet fever while in other cases it resembles measles. Sometimes there occurs an erythema of an infectious character. Though usually early these rashes may occur rather later. They are of no importance.

In one of my cases on the 9th day there appeared an erythematous rash in patches on the trunk & limbs but not on the face. It was quite passing. In another case the face became purple with purple patches on the limbs and trunk but not on the face. This latter was certainly a result of the salal and it is probable that the former was due to the same cause. Various other generalised rashes have been described but are not of much interest.

Purpura may occur but is very rare except in the haemorrhagic form of typhoid and usually indicates a very grave case and is of especially grave prognosis when it comes on late.

Sudamina occur pretty frequently in typhoid and are the same as in other diseases. They occur as little vesicles filled with clear fluid, generally discrete but may become more less confluent. They occur especially on the anterior thoracic walls and axillae but may occur on the neck, abdomen, etc. They generally occur rather late in the disease—often
during the third week.
They are generally believed to be a result of the cutaneous perspiration although some hold that there is no relation between them and sweat. Undoubtedly in many cases there are abundant sudamina with very little perspiration while in other cases with very few sudamina the perspiration is excessive.

In cases treated antiseptically in nearly all of which there is great increase of the perspiration—often excessive—I have not noticed any corresponding increase in sudamina. I have noted them occasionally but never to any very marked extent and certainly never in proportion to the increase of perspiration.

Bolts and Abscesses. They may occur in 2 forms—single or multiple.

Single suppurations are simple and may occur at any period but are generally a rather late complication. These are of local origin and result from pressure and thus are situated on the most exposed parts such as the gluteal region, the calves, lumbar region, etc. They are usually confined to the skin and subcutaneous cellular tissue but may extend deeper and even affect the muscular tissue. They generally progress rapidly, causing elevation of temperature along with increased prostration and aggravation of the general condition of the patient.

As a rule they form an additional element of anxiety in our prognosis. I have never seen these in any case treated antiseptically though often previously.
Multiple Abscesses. Here, the suppurations are multiple and occur in grave cases often following as a sequence of sloughs. They are of late occurrence and are of varying degrees of severity. In the slighter forms the suppurative areas are confined to the skin & subcutaneous cellular tissue and may give rise to very large crops of boils or subcutaneous abscesses which may keep forming with great persistency. In the more serious forms they constitute the typhoid pyaemia proper and occur as a complication in the gravest cases. They occur generally in the form of subcutaneous abscesses often following sloughs and along with these we may have metastatic abscesses in various parts of the body.

Sloughs or bedsores.—These cutaneous gangrenes are not so often met with now owing to greater care exercised, better nursing, etc. I have seen them on one or two occasions in old patients before the antiseptic method was used, but never since. This gangrenous condition usually occurs as a result of pressure formming bed sores but other gangrenes may occur, as gangrene of the toes, feet or it may even extend up the limbs or it may attack the ears, penis, vulva, etc. The most important of these cutaneous gangrenes are the sloughs or bed sores which form on the parts subjected to pressure when the patient is in bed. Their most usual seats are the sacrum, ischium but they may occur on the elbows, calves, heels and
even the occipital region, while the side of the body may be affected should the patient chance to lie on this side—the iliac crest, the great trochanter, the side of the knee and foot being specially attacked. They are rare now a-days and I have never seen them when the antiseptic method was used. They generally occur late—during the third week or later and they are of serious import as they are especially liable to occur in grave cases—ataxic—adynamic—or in weak and debilitated subjects and in those who have been exhausted by haemorrhage or severe diarrhoea. They are also very apt to occur in old persons.

Recovery may occur if the ulceration remains superficial or if the patient is not much debilitated but it often brings about or hastens the fatal result by extension of the ulcerative process or erysipelas may set in with a fatal result.

In some cases gangrenous emboli are produced spreading themselves throughout the body with the result that a general pyaemic process with all its dangers is set up.

The prognosis in the case of sloughs is always grave and especially when the tendency to spread shows itself—showing that the patient's general condition is becoming most unsatisfactory.
Urinary System.

Kidney:

Albuminuria may simply be passing and of little importance or it may be more serious as indicating some pathological lesion. It occurs in a passing form in the slight and uncomplicated cases of typhoid. It generally occurs rather late—towards the end of the second or during the third week but it may occur during the first week. The amount of albumen passed varies with the gravity of the typhoid being greater in amount, appearing earlier and persisting longer in grave cases. The more albumen is present the graver is the prognosis but recovery may occur even when albuminuria has been severe and prolonged. As a rule the albuminuria disappears with the decline of the fever but in some cases it may persist into convalescence and may either disappear then or become a permanent condition.

When the albumen has disappeared on the fall of temperature it sometimes happens that a complication supervening or a relapse, the albuminuria is again renewed—temporarily or permanently.

Typhoid Nephritis may occur with all degrees of severity. In some cases it is only noted by examination of the urine showing the presence of albumen while in other cases it is well marked with all the usual symptoms.

When acute nephritis occurs it may show itself by diminished flow of urine, with tube casts, epithelial
cells, pains in the lumbar regions, with the other symptoms of renal disease masked perhaps to some extent by the typhoid process. Oedema and anasarca may occur with uraemic phenomena and the usual symptoms. Blood may occur in the urine and may come from any part of the urinary system – kidney, pelvis, ureter or bladder – occurring either alone or associated with albuminuria.

Affections of the pelvis of the kidney are rare but haemorrhage and pyelitis may occur.

Bladder – Bladder lesions are rare and are especially apt to occur in grave cases.

Cystitis is the commonest lesion and the inflammation may go on to ulceration with or without perforation or it may go on to the formation of an abscess in the bladder wall. When cystitis sets in it shows itself by rise of temperature with increase of all the symptoms of the fever, pain over the bladder especially on pressure, dysuria, with great prostration. Haematuria may occur. It should, ulceration or abscess occur pus is present in the urine.

Involuntary emission of urine is very common and especially occurs late. It is generally passing.

Retention of urine is also common. It is very apt to occur when the patient is torpid or comatose but it is apt to occur without coma as a result of the salol treatment. This difficulty of micturition is rather common it seems to especially occur in young females. The state of the bladder should always be noted.
Reproductive System:
(a) In the male, orchitis may occur but is rare. It is commonest in adults under 30 and may occur in cases of all degrees of severity. It occurs late and especially in convalescence. It is always unilateral and may occur with or without epididymitis. It may come on abruptly with rapid rise of temperature and great pain or it may come on more insidiously. It presents the usual signs and may go on to suppuration or may undergo resolution at any stage. It generally results in complete cure but some induration may persist for a considerable time. Gangrene of the penis has been noted but is very rare.

(b) In the female various complications may occur. Inflammation and abscess of labia majora may occur. Pelvic haematocoele may occur especially in convalescence. Metrorrhagia practically only occurs in haemorrhagic typhoid. Gangrene of the genital organs is rare and especially occurs late. It may vary in extent—from affection of part of the vulva up to complete destruction of the vulva and even vagina and uterus. There may be no symptoms and it may pass unperceived if a direct examination is not made. When the internal organs are affected there are practically never any symptoms and it is only occasionally that symptoms are present to draw attention to external gangrene. It may result in complete recovery but usually leaves some sequelae such as recto-vaginal fistula, atresia of vagina, etc. It is usually of great gravity.
Nervous System.

Various nervous complications may occur during typhoid such as convulsions and various paralyses and affections of the special senses. These are rare but are important as influencing prognosis.

Convulsions. These may take the form of localised or general convulsions resembling an ordinary epileptic-like seizure. The localised spasms such as we sometimes find affecting a single muscle or a group of muscles are not very uncommon—causing strabismus, hiccup, etc. These are not usually of the grave importance of the generalised convulsions but they sometimes are a precursor of the general form and they have been by some looked upon as a symptom premonitory of a relapse.

Generalised clonic convulsions are of much more serious prognosis but fortunately are exceedingly rare. This condition is of the gravest prognosis especially in children and death may occur during the paroxism or follow soon after. Recovery rarely occurs.

They are probably sometimes of meningitic origin or uraemic and sometimes are probably a result of the typhoid poison acting on the central nervous system.

Paralyses of various kinds may occur to complicate typhoid but are rare except in convalescence. They may occur as a monoplegia, paraplegia or hemiplegia with or without aphasia.

It may have various troubles affecting the special senses,
Various optical troubles may occur such as amblyopia, amaurosis, asthenopia, etc., but are rare. They may be quite passing or may be more prolonged. Auditory complications may come on at any period and may pass off leaving little trace or may leave grave sequelae behind them. Suppurative otitis is the most important and is not very uncommon. It usually appears rather late often during the third week, and is comparatively common even after convalescence has set in. The pus usually finds its way through the tympanic membrane and the perforation may heal up or may remain open with more or less deafness. In some cases complete destruction of the membrana tympani may occur, with destruction of the auditory ossicles leading to complete deafness. Instead of healing occurring, however, further extension of the disease is not unknown with the production of mastoid disease, caries of the petrous portion of the temporal, with extension to the brain and formation of cerebral abscess. This, however, is very exceptional.
The Locomotory System:
(a) The Bones. Changes of an inflammatory nature occurring in connection with the periosteum and the bones are not uncommon. It may be a circumscribed periostitis occurring alone but much more commonly it is periostitis combined with osteitis— that is an osteo-periostitis. It generally occurs late and especially during convalescence, and weeks or months after recovery it may form one of the sequelae.

It is especially apt to occur in children but may occur at any age up to the period when the growth of the osseous system is completed. It especially affects the tibia, long bones, notably the tibia, but may attack the flat bones as the ribs and even the short bones are not exempt. It was present in only one of my cases and affected the left tibia only.

It occurs especially in rapidly growing subjects especially if they are greatly debilitated.

It generally arises without cause—is of an infective nature—but occasionally there is a history of a trauma.

It may occur as a simple circumscribed periostitis which is not of much importance & results in complete recovery.

The more common and severe form is the acute suppurative periostitis or osteo-periostitis for the bone and periosteum are practically always
affected. Together in this variety and it goes on to the formation of pus. The symptoms are very severe—great pain and swelling with high temperature and the ordinary signs of this condition. Fluctuation can soon be made out and relief is got on opening the abscess. The periosteum and bone are generally found thickened and the bone laid bare. As a rule this complication ends in recovery after surgical interference but is often of long duration and may require removal of dead bone.

(b) The Joints—Inflammation of the joints may occur and different varieties of typhoid arthritis are described. Pyaemic or suppurative arthritis where there are multiple abscesses—several joints being affected and this is often associated with acute suppurative periostitis. Monovarticular arthritis may also occur—where only a single joint is attacked. The hip is especially liable. It may result in cure or ankylosis may occur, while spontaneous luxation is not unknown.

(c) The Muscles—Myositis or Muscular Degeneration is practically always present—beginning usually during the first week and attaining its maximum during the 3rd week. It may attack only a few muscles or a large number. The symptoms are very obscure—fatigue, muscular pains, tremblings, etc. As a result of the myositis we have various consequences though of itself the inflammation may not be of much importance. Thus the muscle readily undergoes rupture, with extravasation of blood
causing haemorrhagic foci which may form abscesses.

1. The ruptures are not rare and may be of microscopic size up to tears of considerable extent. They especially occur late – during the 3rd week and later in convalescence. They may occur as a result of any exertion on the part of the patient, sitting up, defaecation, coughing. There may be no symptoms whatever.

In slight cases there may be a slight tumefaction with pain on pressure, at the seat of rupture while in severer cases sudden pain at the time of rupture may draw attention to it. This pain may be severe enough to make the patient cry out & even to wake him when he is in a comatose condition. Cure may result or it may go on to some of the following conditions.

2. The haemorrhages which are one of the consequences of the ruptures are not so common as the ruptures because every rupture does not necessarily show a haemorrhagic focus. They may be of various sizes and occur at the same points as the ruptures. They may present little or no symptom but usually there is a soft fluctuating swelling and a day or two after the skin becomes discoloured over the swollen part. They may result in cure, or formation of a haematomatous cyst or may go on to suppurate or gangrene.

3. Suppurations are rarer than the haemorrhages. They vary in size, there may be one or several at one time and as a rule only one muscle is affected at a time. They generally result in cure or opening but maybe fatal as where it has opened into the peritoneum.
The above complications are by far the most important in relation to the antiseptic, but there are two other classes, viz, where some other disease is grafted on to the typhoid, and the case of other infectious diseases occurring along with typhoid which I will briefly allude to. In these the specific typhoid poison probably plays no part in producing the complication.

**Typhoid Complicated by Other Diseases.**

It seems that typhoid does not very often occur in persons suffering from some acute or chronic illness, but it is not very uncommon to find some other disease breaking out during the course of typhoid.

**Typhoid and Erysipelas.** Erysipelas is not nearly so common as it used to be though I have seen one or two cases. It is commonest on the face but may occur anywhere and it very frequently attacks the inferior extremities and has been known to affect the various mucous membranes as the pharynx, etc. It is especially apt to occur late towards the end of the third week but may occur at almost any period though rare very early or during convalescence. It usually begins at the seat of some old lesion as where ulceration has occurred or a slough or where a blister has been applied, etc.

When erysipelas supervenes it generally brings about a rapid increase of the fever, with accentuation of all the nervous symptoms, often followed by collapse. In some cases it leads to gangrene, and a fatal result may be brought about by oedema glottidis.
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Diseases: Erysipelas

John K. Died 11:40 AM
The prognosis is very grave, showing a high mortality. The most favourable cases occur during convalescence. I have notes of one case which, however, was not treated antiseptically — indeed he was too ill when he came under observation on the 10th day to allow much being done. It was the case of a man aged 39, who came under observation with a temperature of 102.8°. He was very delirious, pupils contracted, clutching with both hands, and the left leg which was marked with old sores showed erysipelas from the toes up to above the knee. The heart was very weak and the tongue dry and dirty. The temperature fell very abruptly as the chart shows but the general symptoms continued with increased severity — continued very delirious flinging his hands about and talking a great deal, sleep and passing urine in bed. The tongue continued very dry, continual fumbling of the hands, became unable to swallow, continued to pass urine in bed and showed symptoms of collapse with feet and hands cold and during the night delirious and shouting. All this time the pulse continued getting weaker and by the end it was very weak and thready, hands and face livid, mouth open, quite unconscious, unable to swallow and death occurred on the morning of the 15th day with a temperature shortly before death of 103°.

Typhoid and Diphtheria. — This usually occurs as a diphtheritic sore throat and used to be more common than it is now when greater care is exercised in keeping children
apart. Probably many of these are not true diphtheria but are due to the presence of streptococci and other organisms. It usually occurs early but may supervene at any period.

The prognosis is extremely grave and in most cases progress with great rapidity and generally ending fatally in a state of collapse.

Typhoid and Malaria may occur together in malarial countries and in persons who have visited malarial countries. I have already mentioned a case of typhoid and malaria in the case of a young man who had just returned from Carolina in the United States.

Sometimes the malaria occurs first, at other times the typhoid occurs first and the malaria is grafted on to this but usually they break out simultaneously. The typhoid symptoms are modified in some respects and we have the periodic behaviour due to the malarial element. It prolongs the fever for a considerable time so that defervescence is late and sometimes it happens that the specific action of quinine is not so marked as usual. In the case I have mentioned large doses of quinine checked the process at once.

Various other conditions might be included in this group such as typhoid and acute rheumatism, or tuberculosis, dysentery, etc but they are not of much interest for my present purpose.

The third group of complications include typhoid along with the various eruptive diseases—measles,
scarlet fever, smallpox and typhus. There are not of any interest in this connection so I need not take up space with them but will rapidly run over the Complications of Convalescence.

Alimentary System: Fissures and ulcerations of the mouth and tongue are not of much importance. Gangrene of the mouth is very rare but is exceedingly grave when it does occur. Parotitis is rather frequent and is very grave too. The return of the appetite may be long delayed from the various causes which delay convalescence.

Vomiting: These may result from dietetic errors and these are of little importance, generally passing off on attending to the diet. More serious cases are those where the vomiting is due to a lesion of the stomach, and in these the condition may be much prolonged and may even become intractable, leading to marasmus and death. Diarrhoea sometimes persists in convalescence and like vomiting may be due to errors of diet - this form is common and quite passing - or it may be the result of an atomic condition of the intestinal ulcers leading to very persistent and intractable diarrhoea with a fatal result following marasmus. Constipation is frequent and has been known to give rise to simple or suppurative typhilitis or perityphilitis. It is not usually of much importance.

Haemorrhage and perforation are quite exceptional.

Circulatory System: Arterial and venous
Thrombosis may occur and pulmonary embolism may result when phlegmasia is present.
In the respiratory system pneumonia is rare. Ulceration of the larynx with necrosis of cartilages may occur and pleurisy—especially purulent—is not uncommon.
In the reproductive system orchitis may occur in the male and amenorrhoea, dysmenorrhoea, pelvic haematocèle, labial abscess and gangrene may occur in the female.
In the nervous system various symptoms such as delirium and paralysis may occur and especially eye and ear complications.
Paralyses are not so very uncommon during convalescence and may occur in almost any form from quite local up to the most general paralyses. Very often the paralysis is not complete—it approaches a paresis rather than a true paralysis and is often associated with increase or more often diminution of sensibility in the affected areas.
We may have a paralysis affecting a single nerve or a pair of nerves. Mental weakness is very common in convalescence with loss of memory and general weakening of the intellectual functions.
These are usually not of grave prognosis as a speedy recovery generally takes place but sometimes the loss of power is prolonged, may last for years and even become permanent. The mental impairment generally soon passes away.
In the locomotory system periostitis and osteo-
periostitis are rather peculiar to convalescence as
in other infectious diseases.

In cases treated antiseptically I have never seen
complications in convalescence. As a rule convales-
ence is rapid, safe and uninterrupted.

I will refer more particularly to the effect of
antisepsis on other complications when I come to
speak of mortality under the antiseptic treatment.

Sequelae of Typhoid.—

Sequelae may be absent but are often left after
typhoid. I have never seen any whatever after the
method, but of course they might have occurred
to some extent after the patients were lost sight of.

Under this term we include all pathological
changes which have occurred during the course of the
fever but which instead of recovering with conva-
lescence have gone on to the formation of definite
lesions as well as all pathological conditions
arising after the fever but which occur as a direct
result of the fever. It is now known that the
typhoid bacillus may be retained within the
body for a long period and may give rise to these
sequelae weeks and months after the patients have
recovered from the fever.

Alimentary System.—Lesions in the stomach
may become chronic and give rise to various sym-
ptoms and especially persistent vomiting which
may become so intractable as to lead to emaciation.
and death or it may give place to the ordinary gastric ulcer with all its troubles. It has been said that dilatation of the stomach is assisted by the typhoid process—probably through the weakening effect of the typhoid poison on its muscular fibres allowing of passive dilatation.

The intestinal ulcers may become chronic—falling into an atomic condition—with no tendency to heal and with the result that persistent diarrhoea is kept up which may bring about marasmus and too often ultimately a fatal result. This condition can not occur in cases treated antiseptically.

Hepatitis may occur leading to cirrhosis.

Circulatory System: The ateritis which is so apt to occur during the course of typhoid may become chronic and lead to various conditions of sclerosis in kidneys, large arteries, etc. This is especially apt to occur in the aorta where a condition of dilatation may result. In one of my cases an aortic murmur was discovered but it was impossible to say whether it had been present before the fever or not.

In the respiratory system structure of the larynx may occur as a result of the ulceration & necrosis of the laryngeal cartilages.

In the urinary system post-typhoid nephritis may occur. Some hold that albuminuria which is so apt to occur in the course of typhoid is only an accident resulting from the typhoid process and
that it passes off with the establishment of convalescence; while others hold that the albuminuria is the beginning of a true consecutive nephritis. In the nervous system, there may remain behind impairment of the mental faculties, such as mental feebleness, loss of memory and even complete dementia while insanity itself is not unknown as a sequel. Any form of insanity may occur and though it is generally passing it may be more persistent and may even become permanent. Hysteria is not uncommon in females. Deafness in varying degree is a common sequel and when suppurative otitis occurs in the very young deaf mutism may result.

In the locomotory system, periarthritis and osteoarthritis are fairly common as sequelae. In no case whatever treated antiseptically have I seen any sequelae occur and it seems almost certain that this treatment makes it quite impossible for most of them to occur.

The Diagnosis and the Differential Diagnosis have no bearing on the effect of the antiseptic treatment and so I will proceed to the causes of death in typhoid.
The Terminations of Typhoid Fever.—

Typhoid either ends in recovery or death, it never becomes chronic.

When recovery is to occur the patient on the completion of defervescence becomes convalescent and may after passing through a more or less prolonged convalescence arrive directly at a state of complete health or convalescence may be interrupted by one or more relapses before complete health is regained.

After complete recovery has occurred the patient is still liable to the various sequelae.

When death occurs in typhoid the fatal termination may be brought about in various ways—from the effect of the typhoid affection, from some local complication directly due to the typhoid or from some complication grafted on to the typhoid process.

Death may occur at almost any period of the disease though it is not usual in the first few days except some special accident occurs. It is not usual to find death occurring before the end of the second or the beginning of the third week but it may be earlier and may be delayed until convalescence or may occur during a relapse.

Deaths in my 4 cases occurred as follows: one on the 8th day of illness and 5th of treatment; one on the 14th day of illness and 3rd of treatment; one on the 19th day of illness and 5th day of treatment; and lastly one with day of illness unknown but on 21st day of treatment. All with complications.
The causes of death in typhoid are as follows:—

Death may result from the typhoid process itself—
the patient is killed by the tremendous dose of the typhoid poison taken in or developed in the body. This form is especially seen in the ataxic-arythmic or hyperpyretic forms. I believe that this cause of death is practically done away with by the antiseptic treatment—except perhaps when the patient comes under observation very late with complications or in an almost moribund condition—because there is no doubt whatever as to the effect of the salol treatment on the typhoid process pure and simple. Not a single death has occurred from the typhoid process alone in cases treated antiseptically. In every case in which a fatal result has occurred—both in Dr. Anderson's cases and in my own—death has never taken place except when complications have been present.

I believe that in uncomplicated cases coming under treatment on or before the 15th day this form of death will rarely occur under this method.

In all cases the temperature, however high is rapidly—within 24 or 48 hours—brought within moderate and safe limits with amelioration of all the symptoms, and remains lower than its highest except some complication supervenes to raise it again.

The haemorrhagic form of typhoid would come under this head where death results from general
Intoxication resulting from the typhoid poison. Sudden death also in most cases results from the direct effect of the typhoid poison though here it acts probably in a more local way. The typhoid poison may bring about sudden death by its direct action on the muscular substance of the heart or on the cardiac ganglia or perhaps it may act on the heart thus weakened by acting directly on the centre presiding over the cardiac innervation.

A few cases of sudden deaths may result from cardiac or pulmonary embolism or from uraemia.

This sudden death generally occurs late—often just when the patient has reached the turning point or just when defervescence has commenced. The patient may fall into a state of syncope without the slightest warning or he may utter a slight cry and fall back and may never wake. Occasionally he come out of one faint only to fall into a second or a third before the fatal result occurs. This condition is nearly always fatal. Occasionally one may be put on guard against it by weakness and intermittency of the pulse with perhaps some tendency to spasms—local or general.

Effect of Antiseptics on Sudden Death. I have not seen a case of sudden death occurring in cases treated antisepically and I am of opinion that sudden death would be extremely rare here. When it is remembered that the antiseptics at once begins to attack the specific poison and that the subjugation of the typhoid process in early, uncomplicated cases is completed at the end
of the 5th day, it is easy to see that this method by overcoming the poisonous effect of the specific intoxication which is required to affect the cardiac centre and at the same time rendering myocarditis if present at all to be of a mild form, modifies the effect on the cardiac and leaves the heart strong enough to resist any tendency to syncope. The only cases in which any tendency to syncope is seen in cases treated antiseptically are those in which we have a very rapid fall of temperature with a very slow pulse—varying from 46 to 48 up to 60—and in these cases it was well to keep the patient carefully in the recumbent position till the pulse returns. No case of syncope has actually occurred except in these circumstances but it is well to err on the safe side.

II

Death may occur from Complications. The complications included here are those which are a direct result of the typhoid process such as intestinal haemorrhage, perforations, peritonitis, excessive diarrhoea, etc., all of which may bring about death by collapse. I am quite of opinion that most of these risks are largely done away with, and even in cases coming later they are very favourably modified. The danger from diarrhoea is absolutely done away with in every case and at every period; the danger from haemorrhage, perforation, etc., are I believe almost removed when the patient is under treatment early. Only one case of haemorrhage has been known to occur and it came late under treatment and it was brought on by an anaemia.
So far from the antiseptic method acting unfavourably on cases with complications, the results are almost more striking than in the uncomplicated cases for in many cases a favourable result occurs which would probably have been obtained by no other treatment. In all cases where a fatal result has occurred some complication has been present when the treatment was begun.

III

Death may result from superadded affections which are distinct from the typhoid process and in no way dependent upon it. That is speaking very generally, however, because although not absolutely proved it seems at all events probable that some of these may be directly or indirectly a result of the typhoid poison such as pneumonia. Among these we may include parotiditis and suppurative otitis with perhaps pyaemia, erysipelas, bronchitis, etc.

As with the previous complications the salol acts most favourably here. It does not very often happen when an uncomplicated case is put early under treatment that complications develop later and when complications are present to begin with they do not prevent the specific action of the antiseptics on the typhoid process.

Many cases undoubtedly are saved which otherwise would be fatal owing to the effect of the treatment which, by removing the pernicious influence of the typhoid intoxication leaves the body in a more favourable condition to combat the complications remaining.
The Mortality of Typhoid.

The comparison between the mortality of typhoid under the antiseptic treatment compared with that of the older methods is certainly not the least interesting subject in this paper. I suppose that most physicians will admit that in spite of all the advances in nursing, etc., the death rate of genuine typhoid still remains very high and that in hospitals generally where the patients are too often weakly and debilitated it is seldom if ever much less than 20 per cent. Occasionally we see a report from some infectious diseases hospital showing a somewhat lower rate but in too many cases this is probably dependent on local and epidemic conditions and the number of cases treated are not often numerous enough to form reliable data. In private practice as a rule better results are to be obtained than in hospital and in the cases with which I deal we had the worst possible material to deal with. These patients, as a rule were drawn from the poorest parts of Dundee, were often wretched and debilitated, often coming late under observation and in many cases suffering from complications when first seen.

Mortality in Cases Treated Antiseptically.

In not a single case treated antiseptically has a fatal result occurred in an uncomplicated case at whatever period of the illness they came under observation.
I will first give a brief summary of the mortality in Dr. Anderson's cases, afterwards dealing with the cases with which I have more particularly dealt.

In Dr. Anderson's first paper he gave a list of 12 patients treated antiseptically with 2 deaths. One death occurred in a very severe case on the supervision of double pneumonia, while the other came under observation at a late period suffering from advanced peritonitis. Both these cases were hopeless from the first.

Dr. Anderson's second paper contained a list of 84 patients treated antiseptically with a total of six deaths as follows:

**Mortality of Typhoid before the Tenth Day.**

Out of 87 patients admitted on or before the 10th day, three died; one on the 12th day, one on the 17th and one on the 24th day. In two of these cases the diagnosis of typhoid was doubtful, in one case the symptoms pointing rather to appendicitis probably with peritonitis. No post mortem was allowed. In the second doubtful case, the patient was admitted on the 8th day suffering from general bronchitis over both lungs, respiration 30 to 40 and pulse 120, with temperature 101 to 103°; abdomen greatly distended, tympanitic and tender. During the 10 days she was under treatment no spots could be made out but on one occasion several doubtful spots were noticed on part of the abdomen which was being poulticed.

The right iliac region presented a round, hard
mass which was excessively tender; latterly this shifted more into the right lumbar region. The diarrhoea was relieved by opium but the vomiting, delirium, high temperature and great distension of the abdomen continued till she died on the 17th day of illness. At the post mortem the following appearances were found:—Intestines distended, but little fluid. Duodenum intimately adherent to pancreas and mucous lining congested. In the small intestine near the ileo-caecal valve was found a large firm faecal mass, the size of a fist. Within 18 inches of the valve the Peyers patches were found swollen and ulcerated. The valve itself was much narrowed on account of swelling, the mucous lining in a sloughy condition. Externally a good deal of swelling and on cutting into this a mass of broken down purulent material was found. Descending colon much contracted, Kidneys congested.

In view of the ulcerations in Peyers patches near the ileo-caecal valve it may be fairly held that this was a case of typhoid complicated with obstruction of the bowel at the valve: and also it may be held with equal fairness that there was no typhoid but that the ulceration in Peyers patches was the consequence of the inflammation set up around the valve by mechanical obstruction.

The latter view was adopted with some hesitation and it was probably a case for operation.

With regard to the third patient who died there
can be no doubt he suffered from typhoid. He was the 5th case of typhoid from an infected household. Admitted on the 8th day of illness he had all the symptoms of severe typhoid with peritonitis.

During the first week 4 days of treatment the early temperatures of 103º to 104º subsided to 101º to 102º but the abdomen remained as at the first greatly distended, hard under the hand and tender. He was violently delirious, trying to get out of bed and refusing to take medicine. After the 4th day of treatment the temperature rose again sharply accompanied by great tenderness over the descending colon and some tendency to loose stools.

It was almost impossible to obtain free perspiration of his skin and latterly the inflammation of the peritoneum appeared to involve the abdominal viscera. He died on the 21st day of illness. No post mortem was allowed.

If the two first cases be regarded as typhoid then the mortality of typhoid when antiseptically treated or before the 10th day of the disease amounts to 6 per cent; while if these two doubtful cases did not suffer from typhoid then we have 49 typhoid patients antiseptically treated with only one death. Moreover, it has to be remembered that the conditions in respect of the physical health of the patients were more severe than are usually met with in private practice.

Mortality of Typhoid After the Tenth Day.
Of Dr. Anderson's 33 patients coming under treatment after the 10th day of illness three died and as might be anticipated the mortality occurred in those patients who suffered from complications at the time of admission.

Case 1. - Male, aged 19, admitted on 12th day, complicated by severe bronchitis over the whole chest. Died 30 hours after admission.

Case 2. - Female, aged 9, admitted on 14th day, complicated by peritonitis with probably colitis. Died on the 22nd day of illness.

Case 3. - Male, aged 32, admitted on 19th day and died on 26th day. There was excessive delirium, abdomen very greatly distended, and hard under the hand, with marked iliac tenderness and the distress of the patient very evident. It was obvious that some dangerous complication coexisted with typhoid but its nature was doubtful.

At the post mortem: Abdomen—all contents bile stained; no peritonitis. Liver enormously enlarged; no perforation of the bowel; spleen large and soft. Small intestines intensely congested, with numerous typhoid ulcerations near the ileo-caecal valve; one large ulceration in the valve. Kidneys enlarged and congested. The liver in its entire substance was enlarged, of a greyish colour, soft and friable like a mass of linseed poultice. Gall bladder thickened in its coats; the colon congested, but no ulceration; heart normal; outlet of stomach contracted; lungs congested but partly collapsed.
To sum up, it will be observed the total number of typhoid patients — including 2 doubtful cases which died — that came under treatment amounted to 84 of whom 6 died, or 1 in 14 or 7 per cent., as compared with 1 in every 5 or 20 per cent. which is the usual death rate of genuine typhoid.

If the 2 doubtful cases be excluded then the mortality of cases coming under treatment on or before the 10th day was 1 in 89 or about 2 per cent., and after the 10th day 1 in 11 or about 9 per cent., and for the whole number it was 1 in 21 or under 5 per cent.

**Mortality in my 38 cases:**

Mortality of patients under treatment or before the 10th day: Out of 19 cases coming under observation on or before the 10th day of illness, 14 of these had no complications and in these no deaths occurred.

Five cases came under observation on or before the 10th day and of these one case was fatal.

This fatal case was that of a young man aged 16, who came under treatment on the 3rd day of illness having a temperature of 103.6° and with acute bronchitis as a complication. The illness began with a severe rigor and considerable vomiting. On the first night of treatment he was very delirious and noisy, attempting to get out of bed and there was great abdominal tenderness.

On the evening of the 4th day of illness the temperature went up to 104.6°. On the 5th day of illness he had 2 stools in one of which he passed 18 inches of a tape-worm. The abdomen continued distended and he
was very noisy and delirious; on this day the temperature went down to 103.6° and on the evening of the 6th day of illness—3rd day of treatment—it fell to 102° and at this stage pleurisy developed, the temperature began to rise again showing the inverse type—rising in the morning and falling in the evening—until death occurred at 1:45 A.M. on the morning of the 9th day of illness—the temperature being 103.4° when taken at midnight about 2 hours before the fatal result.

It will be seen that the temperature was already brought within safe and reasonable limits when pleurisy supervened bringing about a fatal result. In sum—this gives a death rate of 1 in 19 or about 5 per cent, if we take all the 19 cases—with and without complications—admitted on or before the 10th day of illness—only one death.

If, however, we take only the 5 cases with complications at the time of admission we have one death in 5 cases or 20 per cent, which is only about the average death rate of all cases of typhoid under treatment.

Mortality of Typhoid after the Tenth Day—

It may be remembered that of my 38 cases 19 of them came under observation after the 10th day of illness—in this group being included all cases in which the date of beginning was unknown—most of these cases of doubtful origin having had a somewhat prolonged course.

Of these 19 cases 11 of them came under observation without complications and all recovered, while of the
8 cases coming under observation after the 10th day with complications at the time of admission three cases ended fatally and these were as follows:

Case 1. This was the case of a man aged 34, who came under observation on the 14th day of illness with a temperature of 103.4°, tongue dry, hard and black, had hiccup twice, pupils dilated, numerous spots and lower half of right lung dull, back and front with great wheezing over whole chest. On the 15th day of illness the temperature went down to 102.6° to 99.8° in the evening; tongue continued dry, hard and black and was unable to put it out; nose sharp, constant fumbling of hands with muttering talk; abdomen tense. On the 16th day of illness i.e. third of treatment— the whole of the right lung became dull and temperature began to rise again; tongue beginning to become moist and whole appearance rather better and continued rather better on the 17th day—more conscious.

At 5.30 on the afternoon of the 18th day of illness—4th day of treatment—he had an enema of soap and water which was followed in about 15 minutes by haemorrhage—about 2 pints—which was followed by collapse and death at 12.15 midnight—the temperature shortly before the fatal result running up to 105.6°.

It will be noticed that this was a very grave case from the first and that the salol was beginning to show its effects—reducing the temperature and rendering the whole condition better—when the haemorrhage supervened.
In this case intestinal ulceration was probably far advanced when treatment was begun.

**Case 2**—This was the case of a girl aged 13 who came under treatment with date of commencement unknown, with temperature 102.6°, distinct tenderness over right iliac region and duodenum; spots well marked and symptoms of acute bronchitis. The temperature on the following day rose to 103.4° with increase of abdominal and chest symptoms; it then fell to 100.2° but with further increase of the symptoms it began to rise again showing considerable morning remissions till on the 10th day of treatment pneumonia definitely showed itself along with symptoms of peritonitis and a fatal result soon followed—on the 21st day of treatment. This was a grave case from the commencement and in all probability ulceration was advanced before the treatment was begun.

**Case 3**—This was the case of a young woman aged 24, admitted on the 11th day of illness with temperature of 104°. The illness began with shivering and vomiting and when first seen the tongue was dry and black, she was very delirious, showed many spots and had left pneumonia with cough and wheezing over the whole chest as well as necrosis of the right fibia. Salol was commenced on the evening of the 11th day and on the 12th day the temperature gradually fell to 98° and taking on the inverse type. Later she showed collapse symptoms and died at
Ten minutes past five on the morning of the 14th day of illness - the third morning of treatment. These notes will show that these were all very grave cases and that recovery under any method of treatment was very improbable from the beginning.

In summing up it is thus seen that out of 219 cases admitted after the 10th day we have a mortality of 3, which is barely 1.6 per cent, or about 4 per cent below the average mortality of all cases of genuine typhoid. In the whole 38 cases we have thus 4 deaths = 1 death in 9.5 patients or a little over 10 per cent, which is only about half the usual death rate in typhoid.

Putting all the cases in tabular form we have:

(a) Cases coming under treatment on or before the 10th day.

D. Anderson's first list 8 patients with 1 death.

  second 51 "  " 3 "

  Tindal's 19 "  " 1 "

Total cases before 10th day 78 "  " 5 "

= 1 death in 15.6 patients = 6.4 per cent.

(b) Cases coming under treatment after the 10th day.

D. Anderson's first list 4 patients with 1 death.

  second 33 "  " 3 "

  Tindal's 19 "  " 3 "

Total cases after 10th day 56 "  " 7 "

= 1 death in 8 patients or 12.5 per cent.

(c) All cases treated antiseptically before or after 10th day.

D. Anderson's total cases 96 patients with 8 deaths

  Tindal's 38 "  " 4 "

Total cases treated antiseptically = 134 "  " 12 "
which is equal to 1 death in 11 cases or barely 9 per cent. (8.9%) and it will be admitted that this compares very favourably with the death rate under any other method of treatment.

But in estimating the value of this method of treatment it is not enough simply to consider the death rate. We must also remember that it shortens the whole course of the illness, prevents the prolonged high temperature and severe prostration, abolishes diarrhoea, prevents complications, allows a speedy and safe convalescence and prevents sequelae.

It seems to me to give results which have been obtained by no other method. We may see now and again reports of other methods—whether by other antiseptics or not—in which in one or two cases good results have been obtained but in no other method of treatment do we get results so certain, so uniform and so satisfactory.

I have seen many cases cured by this means which would have considered altogether hopeless before its introduction.

I will now proceed to give a brief account of this antiseptic method and I will not take up time by dwelling on prophylaxis, dietary, etc., for these are just the same as in other methods. Probably in many of these cases solid food might be commenced sooner than was actually done because it was deemed prudent to use all caution to begin with.
The Antiseptic Treatment.

The old method of treatment principally consisted in treating the symptoms as they arose — reducing the temperature by antipyretics, checking excessive diarrhoea, attending to diet, supporting the strength of the patient until the disease had exhausted itself and then carefully guiding the patient's progress through convalescence to health.

There is probably no disease in the whole course of medicine more difficult to treat, where the results are so uncertain and where complications of various kinds are so apt to arise to trouble the course of the disease as in typhoid and if it can be shown that this antiseptic method provides a reliable and certain means of treating the disease — in other words that it exerts a specific influence on the disease — its value and importance will be readily admitted.

In order that it shall be considered a specific remedy it is not necessary that it shall be required to cure every case which comes under treatment but if it can be shown — as I think I have shown — that it acts in a definite way in every case, cutting short the disease and acting on the temperature always in the same way and as nearly as can be made out in about the same time, it seems to me that its claims to be considered a specific are in a fair way to being established.

Thus in treating acute rheumatism we find that although the salicylates exert a specific influence
on the disease, nevertheless, we do not by any means expect that every case of acute rheumatism shall recover, and so in the case of typhoid we cannot expect a cure in every case, even if it is definitely proved that salol acts as an undoubted specific because the case may come late under treatment with complications, etc., which do not allow a fair trial of the method. Indeed, there are few diseases where we see so many cases have the patients coming so late under observation as in typhoid and where we find so many unsatisfactory elements entering in to prevent us from making a fair attack upon the disease. It has been long known that typhoid is a result of the activity of the typhoid bacillus. This bacillus is taken into the body and finds its primary habitat in the Peyer's patches and solitary glands of the small intestine where it undergoes under favourable conditions rapid multiplication and as a result of its growth and multiplication it produces the various toxins which are the cause of the characteristic symptoms of typhoid. At first the bacilli are probably more or less confined to the Peyer's patches and solitary glands but soon they become located in other situations where they also undergo growth and multiplication. Their choice of habitat lies in the lymphoid tissue—especially in connection with the intestinal canal but there is probably no position in the body where this tissue is present in which these bacilli are or may not be found.
As a result of the excessive multiplication and growth, we have poisoning of every organ and tissue in the body by the products produced during their multiplication and it is found that various other organisms are practically always present, especially in the bowel, which also exert a noxious influence on the patient. The secondary organisms probably in many cases play a prominent part in the production of complications and it is difficult to say definitely how far their presence may be a necessity to allow of the conditions required for the proliferation of the specific bacilli. There seems to be little doubt that a certain amount of the poisonous effect on the system is due to those secondary organisms which are probably in most cases of a saprophytic nature. We know that before growth and multiplication of the typhoid bacilli can take place certain conditions are required such as a proper soil with proper temperature, etc., and provided the proper conditions are attained rapid proliferation of the bacilli occurs.

Streptococci and various septic organisms are frequently found in the tissue of the spleen, liver, and wall of the intestine.

We know that the typhoid bacilli can grow in the presence as well as in the absence of oxygen but it appears to have somewhat different functions and powers in these different conditions. When outside the body in the presence of oxygen it develops great resistant power and a saprophytic habit.
while in the anaerobic condition and especially in the intestine, although its power of breaking up the albuminoid substances presented to it and of developing its specific toxins is greatly increased, its power of resisting antiseptic substances is considerably diminished.

Now there are various ways in which the antiseptic method might act. Thus it may act directly on the bacilli so as to paralyse and ultimately kill them and so cut short the disease; or it may alter the soil so as to render it unfit for the development of the bacilli; or again it may act upon the various toxins as they are produced and in this way keep down the typhoid symptoms until the bacilli exhaust themselves and so allow the disease to die out.

Probably when a case of typhoid comes under treatment very early the antiseptics will act both on the soil rendering it an unfit nidus and at the same time may paralyse the bacilli and so render them an easy prey to the phagocytes which are always on the look out. When a case comes under treatment later there will be a more difficult task for the antiseptic because the ptomaines will by this time have reached every part of the body while the bacilli will also now be present in various parts and it is probably owing to these conditions that it is rather more difficult to subdue the disease when the patient comes under treatment late. It will be shown however, that when the salol splits up we have formed
a volatile antiseptic which is probably able to reach every part of the body and so to act on the specific poison. In every case the antiseptics act upon the secondary organisms which are so numerous especially in the bowels and thus put an end to the various fermentative and putrefactive processes which go on there as a result of their activity. It is probably the case that at first the antiseptics act so as to exert a paralysing effect upon the typhoid bacilli and it is only when this action is prolonged that they undergo complete destruction. I think this explanation would explain the very rare occurrence of a relapse occurring under this treatment. Thus in one of my cases there was a relapse which occurred in a case where the salol treatment was stopped before the temperature had quite reached normal. It remained subnormal for some days and then the temperature rose again and the patient suffered from a well marked relapse. What I would offer as an explanation of this is as follows. I believe that the antiseptics exert a destructive influence on the typhoons and at the same time they first paralyse and then destroy the bacilli, removing the conditions necessary for their growth and perhaps being aided by the phagocytes. A certain time must elapse before all the organisms are killed outright. How in this case the salol was stopped early when the bacilli were probably only paralysed and not destroyed and after a few days when the conditions necessary for their development were regained the
paralysed bacilli again became active and a relapse was the result.

There is probably no other substance which gives so pronouncedly the different antiseptic actions which are required to destroy such a disease as typhoid. Thus we want a substance which will exert a very pronounced action on the intestinal contents as well as one which will exert an action upon the specific poison wherever it is and we have both this local and general action produced in an eminent degree by the splitting up of salol which splits up into the volatile phenol and the non-volatile salicylic acid.

We know that the carbolic acid must by some means extend its influence throughout the body not only because the subsidence of the typhoid symptoms takes place so rapidly but because of the peculiar odour given to the breath and to the sweat which is probably principally due to the volatile antiseptic.

The non volatile salicylic acid will constantly keep the intestinal contents in an antiseptic condition while the volatile carbolic acid will be constantly passing finding its way to the bacilli multiplying in the intestinal walls and diffusing itself throughout the body.

It has been argued that enough salol cannot be given to ensure destruction of the typhoid process and it will be remembered that one method of use in the diagnosis of the typhoid bacillus consists in adding some carbolic acid to the medium which is said to prevent
the growth of the other organisms but allows the more resistant typhoid bacillus to grow. Even supposing this is the case, the amount of carbolic acid used must be exceedingly small or else the growth of the typhoid bacillus would also be arrested. We thus see that a very small amount of carbolic acid produces a very marked action on most organisms and probably the same inhibitory action if to a lesser degree on the typhoid bacillus. We must remember, however, that the amount of carbolic acid set free amounts to 36 per cent of the salol taken and if the full dose of salol be maintained we get proportionately a large quantity of carbolic acid set free in the bowel while we also have the large quantity of salicylic acid which will assist the phenol in producing complete antisepsis. There is no doubt that in most cases it can be tolerated in pretty large doses. The amount of salol given in different cases varies from 300 or 400 grains up to 1400 or 1500 grains during the whole course of the fever. When the full dose is maintained in an adult as much as 120 to 140 grains may be given in 24 hours during the first 2 or 3 days and this amount may gradually diminished as the symptoms subside.

We see that the antiseptics are administered in such a way that a constant action is obtained - the salol is given often and in such a form that the intestinal walls and contents are kept constantly saturated and a constant diffusion of the volatile
antiseptic is kept up.

Salol. \((C_6H_5 - C_7H_5O_3)\) is a salicylate of phenyl and occurs in the form of small white crystals having a slight aromatic wintergreen odour. It is almost tasteless, is insoluble in water but soluble 1 to 10 in alcohol, 2 to 1 in ether, and is also soluble in fixed oils and a trace of glycerine. In the small intestines, salol, under the influence of the alkaline pancreatic juices becomes split up and yields 36 per cent. of phenol and 64 per cent. of salicylic acid.

Salicylic Acid is well known as an antiseptic which prevents putrefactive and fermentative processes. It has no smell and causes little local irritation and is non-volatile which, however, is scarcely a disadvantage here as it is in some cases because we have the volatile carbolic acid produced at the same time. In large doses its effects resemble those of quinine and large doses alone tend to act as a direct poison upon the heart and respiration. It is only partly destroyed in its passage through the organism and reappears in the urine as late as 50 hours after it has been taken, partly as such and partly as salicyluric acid. It is quite harmless even in gramme doses.

Carbolic Acid. \((\text{Phenic Acid} ; \text{Phenol} ; \text{Hydrate of Phenyl} ; \text{Phenyl Alcohol})\). This occurs in colourless crystals which are liable
to become pink and it is neutral to test paper. It is a powerful disinfectant, prevents putrefaction and applied locally it has an anaesthetic action, similar but inferior to cocaine and has some antispasmodic action.

Carbonic acid has been used alone and with quinine in the treatment of typhoid but probably no method of administration is so satisfactory as giving it in the form of salol.

The formula which I have always used and seen used is in the form of a mixture containing chlorodyne and Syme's milk of bismuth and is as follows:

\[\begin{array}{c}
Pulv. Salol. & \text{grs} 160 \\
\text{Chlorodyne (B.P.)} & M 160 \\
\text{Lac. Bismuthi (Syme's)} & \frac{3}{vii} \\
\text{Aquam., ad} & \frac{3}{viii} \\
\end{array}\]

\text{Sig.}

For adults: 3 IV every 2 hours.

Between 6 and 14 years: 3 II every 2 hours.

Under 6 years of age: 3 I every 2 hours.

It was found advisable to administer the salol in this form, especially having regard to the inflamed, irritated and often ulcerated condition of the intestines, the intention being to secure constant and continuous contact and adherence to the diseased intestines of material thoroughly saturated with the antiseptics.
By using chlorodyne and this preparation of bismuth we get the required continuous effect along with a soothing and sedative action which is most desirable.

In preparing the mixture, the salol should be rubbed in a dry mortar, and the mixture which is very palatable should be well well shaken and always be carefully administered in a medicine glass. The salol is only suspended in the mixture, not dissolved, and on putting down the bottle, the salol sinks to the bottom and it is important always to shake the bottle so as to be sure that a full dose is being administered.

This has been found to be the most reliable as well as the most efficacious form in which to administer the salol.

The dose varies according to the age and state of the patient but after some trial and consideration it has been found that the best results are obtained when a full dose is given every 2 hours and repeated until it is beginning to produce its specific effect, when if necessary it may be somewhat reduced in amount. In doing this the object aimed at is to establish as rapidly as is consistent with safety a condition of complete antisepsis of the whole intestinal tract and contents. When antisepsis is fully established various changes occur: the stools become black, without odour and after the first few days they are partly
formed. In some cases the condition of the stools shows that complete antisepsis of the intestinal contents has not been obtained. Thus when the stools are only partly dark and are mixed with greenish or yellowish matter or are fluid or foetid we know that the effects of the specific poison are not completely neutralized.

When antisepsis is being established too rapidly or is being pushed too far the urine becomes smoky or dark and it may be necessary to diminish the dose or to omit it once or twice.

In determining whether antisepsis may safely be established rapidly or more gradually the condition of the patient is our most important guide. When a patient comes under observation on or before the 10th day suffering from uncomplicated typhoid the mixture should be administered in full doses every 2 hours and after the 3rd day of treatment when the symptoms have subsided the dose may be safely reduced.

When the patient comes under observation at an advanced stage — after the 10th day — with ulceration established or sloughs formed it is not so easy to establish rapid and complete antisepsis.

Owing to the various complications which are so often present a difficulty is placed in the way of producing rapid and complete antisepsis and the administration of the medicine must be carried out with the greatest care and watchfulness.
Every detail must be watched with the utmost care and the medicine given in the usual way to begin with and then if any difficulties arise the dose must be reduced or in some cases a reduced dose has to be given from the commencement. It is sometimes found when difficulty arises that if the dose is reduced for a short time the patient seems to establish a tolerance for the drug so that he may be put on a full dose again and the same may happen after the medicine has been omitted altogether once or twice.

In these cases the antiseptic overcomes the typhoid disease in the usual way probably converting the specific into simple ulcers and at the same time exerting a favourable influence on whatever complications are present.

As a rule even when complications are present it is not found necessary to give many other medicines but if complications require special treatment the necessary means may be employed with some slight reservation which I will mention later.

In cases such as these the antiseptic must be maintained for a longer period, our care and watchfulness redoubled, and the utmost attention paid to diet.

If complications are present as they so often are in the poor and ill fed patients who come under treatment in hospital the gravity is much increased by the extra strain which this new affection throws upon the system already sorely pressed by the
typhoid and we see that the chances of recovery are
immensely greater if we can establish full anti-
sepsis so as to eradicate the typhoid and thus leave
the patient to fight simply against the complication.
During the time when the antiseptics are overcom-
ing the specific effects of the typhoid we must at
the same time battle with the complications in the
best way we can so that when the symptoms of the
typhoid pure and simple have subsided our patient
is left in the best possible condition to make a good
recovery.
In a large number of cases within 36 or 48 hours of
treatment the more dangerous symptoms subside
so that we have our patient in a fairly safe state.
When the patient comes under treatment at an early
stage the conditions for cure are most favourable
because the typhoid affection is completely destroyed
at the end of 5 days and the various complications
resulting from the typhoid process—such as heem-
orhages, ulcerations, perforations, etc.—are prevented.
When the patient comes under treatment after the
10th day the typhoid process is completely neutralised
and destroyed in from 5 to 7 days and the after progress
depends upon the nature of the complications—such
complications being in very many cases present before
treatment was begun.
As to the effect of the treatment on the hospital wards
generally I cannot do better than quote some words of
Dr. Anderson on this point.
"The typhoid wards wherein this method is carefully carried out present a notable contrast as compared with the same wards before the antiseptic period, in this respect repeating exactly the contrast in surgical wards before and after the introduction of the antiseptic treatment of wounds. In typhoid and surgical wards alike antisepsis effects the same beneficial revolution. Just as antisepsis in surgery banished erysipelas, hospital gangrene and pyaemia from the surgical wards, even so, and by the application of the same principle, does antisepsis in typhoid banish intestinal ulcerations, severe diarrhoea, haemorrhage from the bowels and septicaemia from the typhoid wards."

Precautions to be taken and Dangers Occurring during the Administration of Antisepsis.

Our object in carrying out this method of treatment is as I have already pointed out to bring the patient as rapidly as possible under complete antisepsis but occasionally we find some difficulty in bringing about this state. Thus, in certain patients it is found that owing to some peculiarity of constitution they are unable to tolerate a full dose and the dose must be limited until a condition of tolerance is established. The same thing occasionally happens when a patient comes late under treatment with complications advanced and when such is the case it is found more difficult to induce full antisepsis and the greatest care must be exercised—
reducing the dose or even omitting the medicine altogether for a time or two.
One patient will tolerate a full dose every 2 hours for days on end while in another one half that amount may produce various disturbances or dangers which I will now mention.

Alimentary System:

Diarrhoea: One of the great dangers of typhoid under the old methods of treatment is that resulting from excessive diarrhoea and it is important to bear in mind that under the antiseptic method diarrhoea is quite stopped.

Owing to this it is usually found necessary to administer an enema of warm water and soap every second morning so as to prevent the occurrence of an obstinate constipation which would tend after a day or two to cause severe straining to go to stool with all its consequent dangers. Sometimes the enema will require to be repeated before a motion is produced.

In a few grave cases it is found that diarrhoea to a slight extent may occur and this is especially the case when congestion of the duodenum or the descending colon is present; but this is never severe enough to cause anxiety and if pain is present a morphia suppository or lead and opium pill will generally be found to be all that is required.

In occasional cases, too, when the patient comest late under treatment and with complications in an
advanced state we find that one or two stools may take place every day or every other day without an enema but these cases are quite exceptional and an enema every second day is the rule. It is necessary that the enema be administered with the utmost care; more especially if treatment is not begun till after the 10th day when ulceration may be present and we have risk of haemorrhage as I have already shown occurred in 1 of my cases.

**Vomiting.**—As a rule the effect of the antiseptic treatment is to put an end to the obstinate vomiting which is sometimes present in typhoid but we occasionally find that the salol mixture itself produces or tends to produce sickness and vomiting. As a rule this vomiting is temporary and soon passes off after the first few doses of salol but occasionally it persists and we require to make some slight alteration in our method of administration. Thus to begin with simply reducing the dose may be tried and if that fails we may try giving the salol in wafer paper or in the form of tabloids. If all these methods fail then we must omit it altogether for a dose or two and then begin again with a small dose which is gradually increased to the full dose as tolerance becomes established. Should the patient be able to begin with the salol in wafer paper or in the form of tabloids it is better to recommence the mixture as soon as the patient has come fully under as it
is found that the salol acts better in the mixture than in any other form.

Occasionally the tongue does not clean so rapidly and completely as is usual under the antiseptic treatment. These are usually severe cases where there has been considerable abdominal complication and it is generally found that there is considerable abdominal distension with hardness under the hand and this even when all the typhoid symptoms have disappeared and the temperature subnormal. In such a case it is advisable to continue the salol—unless for some other reason it is contra-indicated—at the same time paying particular attention to diet and applying fomentations to the abdomen.

_Circulatory System_

With the fall of the temperature it is occasionally found that a very marked slowing of the pulse occurs down to 60 or even to 40 or 50 and then it is important to keep the patient in the recumbent position and to take care that the patient does not rise or sit up and so induce syncope and it may be necessary to give stimulants.

_Integumentary System_

Under antisepsis we generally find that after from 24 to 36 hours the body becomes covered with a gentle perspiration which is especially abundant about the face and temples and with this we have some fall of temperature and general improvement of the
patients condition. It sometimes happens, however, that the perspiration becomes excessive with tendency to become clammy and it may be necessary to diminish the dose or omit it once or twice. Occasionally when the excessive perspiration occurs a sudden drop of temperature of from 5 to 7 degrees takes place and this may be followed a day or two later by the development of pneumonia — generally in the lower half of the left lung.

In other cases with this excessive perspiration there may occur coldness of the extremities with symptoms of collapse and in some cases it is found that the face becomes cyanosed in from half an hour to an hour after taking the medicine.

Sometimes even when the perspiration is not excessive when a sudden fall of temperature occurs or when there is a tendency to coldness of the feet, it is necessary to exercise great care in continuing the medicine. In all these cases it is dangerous to continue the full dose. We must either reduce the dose or omit it once or twice and at the same time administer stimulants and apply hot bottles, etc., if necessary. Owing to this tendency to excessive perspiration with tendency of the sweat to become clammy it is advisable to continue occasional sponging and rubbing of the patient.

All these conditions show the necessity for great watchfulness on the part of the nurse and frequent taking of the temperature which should be taken
every 3 or 4 hours.

Urinary System. — When full antisepsis is established the urine becomes dark or smoky and this becomes more marked when the urine is allowed to stand some time. As a rule this soon passes off but if it persists it is advisable to reduce the dose of salol or omit it altogether once or twice.

Sometimes full antisepsis produces difficulty of micturition which may require the use of the catheter. It usually soon passes off but if it persists the dose may require to be reduced.

Medicines. — As to giving other medicines at the same time that is not often necessary as we have diarrhoea and the other symptoms which usually require treatment quite under our control but sometimes we find severe abdominal pain present and a morphia suppository may be occasionally required. Sometimes in the case of children the mixture must be stopped owing to the action of the chlorodyne and tabloids substituted but they are not nearly so efficacious. That, however, is quite an exceptional case.

Occasionally we may require to use stimulants and it is important to remember in this connection that carbonates are contra-indicated and it has been found that carbonate of ammonium induces a return of the diarrhoea.

While full antisepsis is being maintained it is generally found advisable to administer a little
stimulant — usually 2 or 3 ounces of brandy during the 24 hours — and sometimes a little hot wine; negus assists in promoting perspiration.

Then as to the diet, nothing except iced milk and water are given until the temperature has been subnormal for several days; then bread — six ounces — is given, followed in a few days with beef or chicken tea, afterwards fresh fish and rice and milk, and then gradually we are to ordinary diet.

In conclusion, I would simply say that I have stated the facts just as they were observed and that it seems to me that there is no method of treatment which gives so uniform and so satisfactory all round results as that which I have described. Not only have we the chance of complications greatly diminished and the whole state of the patient kept in a satisfactory state with the prospect of a good convalescence and the avoidance of sequelae but we have almost an entire absence of all the most alarming symptoms and complications which used to be so general throughout the course of the illness and so difficult of treatment. We have longed the great dangers of diarrhoea, hyperpyrexia, haemorrhages, etc., to deal with — and no more need for cold baths and other elaborate methods of reducing the temperature. The only troubles that this method entails are the frequent taking of the temperature and the administration of enemata and surely this latter
trouble is small compared with the immense
difficulty of dealing with the persistent and foetid
diarrhoea of the old methods while the frequent tak-
ing of the temperature is surely of little note when
compared with the necessity of applying cold packs,
cold baths, etc., as used to be so often required.
This method, too, is peculiarly adapted to private
practice; every medical man can employ it, there
is no elaborate apparatus of any sort required and
with an intelligent nurse it can be carried out
safely and satisfactorily.
When we remember the poor and ill fed patients
we have to deal with in hospital—often coming
delirious under treatment with grave complications
already present, we can see that probably very
much better results even will be obtained in private
practice where the conditions are more favourable
to a good result—than those which I have described.