The making of a prognosis requires a consideration of the age of onset, form of the disease, the influence of special episodes, the spinal fluid findings, and the influence of treatment.

While the duration and course may vary in the different types, the final outcome is the same in all cases.
Cincinnati Sanitarium.

ACUTE INFECTIONS OF CHILDHOOD*

BY R. M. POLLITZER, M.D.,
Clinical Professor of Pediatrics, Medical
College of the State of South Carolina,
Charleston, S. C.

It might seem a physical impossibility to discuss the acute infections of childhood in a single paper, but there are certain general principles and points of contact which are exhibited by them and these can readily be considered briefly. While children have many of the diseases of adults and we find the converse equally true, yet there are certain diseases which are confined almost entirely to childhood, and some of these are rather hastily dismissed under the category of "the diseases of childhood." Most people and many physicians, too, consider these ailments as mere trifles unworthy of serious consideration. To a busy physician in general practice, possibly straight from a tedious hysterectomy, naturally a slight bronchitis and conjunctivitis, perhaps the onset of measles is not especially interesting. And yet what a difference a day may make to other children.

During the past few years the child welfare movement has undoubtedly made great strides. Society's whole attitude has changed. Most people no longer regard children as little nuisances. The average mother today is interested in feeding her child properly, even though frequently her notions are wide of the mark. Furthermore, she shuns any exposure to tuberculosis, goes far from infantile paralysis and shudders at hearing of any disease or condition with a new name, such as acidosis. But the time has not yet come when

she realizes that the commonest children's diseases in reality take the greatest toll.

Again and again we find people who insist that measles and whooping-cough do not amount to anything. Nevertheless, during 1916 in the registration area of the United States there were 7,947 deaths from measles and 7,284 from whooping-cough. You may say we know all this. Yes, you do, but the man on the street who has children to be protected does not. And because of his ignorance the child mortality is unnecessarily high. Not that we can give any sure way of escape, but since the diseases can be postponed for several years, this should be our endeavor. All statistics prove that the highest mortality is before the fourth year, at least in measles and whooping-cough. There are many diseases which, while they are common in childhood, apparently differ widely as to symptoms and signs. However, there are several which because of their extreme contagiousness and their almost constant presence, may well be considered together. Measles is certainly very different from whooping-cough and yet broncho-pneumonia is the commonest cause of death in both. Scarlet fever with its punctiform erythema off-hand would not be confused with diphtheria, but both are characterized by a sore throat.

Let us take stock, as it were, of our knowledge of measles, whooping cough, scarlet and diphtheria. Notwithstanding some recent excellent work, the causative factor of measles has not been found. Until it is, we shall have to postpone the solution of many of its problems. But clinically the diagnosis is easily made before the rash. This early diagnosis is most important for the safety of others. One great field here would seem to lie in the education of the people first that measles is most contagious before the eruption and that it is a very serious disease, especially in early childhood. The most important points in the management of the case is close attention to ears, mouth and lungs. In general, measles is very badly treated by the practitioner. Aside from a cough mixture and drops for the eyes, he does nothing that the grandmother could not do. It is a reproach to medicine or the modern conception of the doctor's function that many individuals

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do not employ a physician for this malady.

Since 1906, the organism responsible for whooping-cough has been known, although the scientific world has been quite slow in accepting the Bordet-Gengou bacillus as the sole cause. Very probably we in time shall make more use of cultures in establishing the diagnosis. However, today the diagnosis is made clinically, and usually very late, which is not surprising. For until the paroxysmal stage ensues, aside from the blood count, which is often uncertain, as guides we have only the progressive nature, the frequency at night, the laryngitis and occasionally the vomiting. Of course, history of exposure or the presence of an epidemic is most important. But frequently a correct history is not obtainable. Whooping-cough is a disease of very early life. Eighty per cent of all cases are in children under five. Unfortunately there is no immunity or even partial immunity in the first year of life. The only reason that more infants do not contract it is because they are not exposed. This factor in escape is more common in the first born. From time to time we see the disease in the first month. In September, 1918, I attended a white male who was born with a cough and whooped on the ninth day. He contracted it from his mother. Although I have no figures as to its frequency in the first year, yet of the cases that occur one-half die. Furthermore, 97 % of its total mortality is among those under the fifth year. It has been shown by John Lovett Morse that pertussis is more fatal than scarlet fever. It has been well said that whooping-cough is a disease the mortality from which entitles it to more serious attention than it usually receives from physicians and parents.

In South Carolina alone in 1918, two hundred twenty-four children died from it. Because the disease at its onset is only a cough and throughout its course usually does not necessitate being in bed, there is a most excellent method of spread. The patient does not have to wait for the approach of his victim, but goes in search of him. It is the common practice to advise keeping the child in the open as much as possible, but it is uncommon to caution against going near others. I am

perfectly willing to admit that the prophylaxis of this disease is difficult, but I can not agree that because of the difficulty we should not make the attempt.

Prophylaxis, to be effective, should be viewed as a matter of both public and private health. Isolation probably is out of the question until such time as all large communities can have contagious hospitals. In the meanwhile all those affected should most certainly be compelled by law to wear some conspicuous insignia of the malady.

So very much has been written in regard to the vaccines that the literature has become bewildering. And yet after reading the adverse reports and the numerous pleas the sensible course is to be guided by our own experience. However, we must sharply differentiate between the use of a vaccine as a means of prevention or of cure. It is true that at times where it is begun as a prophylactic measure we realize after the first or second dose that the disease is already present. Nevertheless, it may be used in well children before exposure or before the onset as an immunizing agent. The reports as to its efficacy are quite varying. In a few cases I have employed the vaccine in well children who have never had the disease. Subsequently, they were unintentionally exposed and did not contract it. From most reports it would seem as though artificial immunity lasts for about a year. This subject is deserving of more study.

As to treatment, I think some progress has been made. At least we have frankly abandoned many worthless drugs. All of us today rely to a great extent on fresh air free from much dust. Over and over again we are told that it is less often that a paroxysm occurs outdoors. However, the great difficulty is to make people understand that vigorous exercise and automobiling are not included in the prescription. Probably sodium bromid with antipyrin is effectual in a large measure as often as any other drug. For the past three years in most cases of pertussis I have employed the stock vaccine. Where it was commenced late, it proved worthless; and at times even early it had little if any effect. But on the whole in many cases the paroxysms were not severe and the disease was of less than usual duration. On

the whole, I believe it is worth using. Until the time comes when we are able to accomplish its defeat therapeutically, we must endeavor to impress on the public the fact that pertussis is a menace. Ruhrah has well said, "There is no other disease causing the same amount of suffering and the same danger of life in which there is the same disregard for the feelings and the rights of others."

Notwithstanding the finding of a diphtheroid bacillus in the throat of scarlet patients by Mallory, in 1916, as yet we lack sufficient evidence to accept his theory. Unlike many other of the acute infections, aside from the clinical phenomena our knowledge in this disease is very incomplete. We are not even sure that it has been transmitted to monkeys. There is not a single drug that has the least effect in modifying its course.

It has a greater variability in its virulence than most diseases except influenza and infantile paralysis. We know that it is not nearly so contagious as measles and whooping-cough, notwithstanding the popular belief to the contrary. In general, close and prolonged contact is essential to its transmission. Furthermore, we in the South seldom see the severe cases that are so common in New England. Unless throughout this whole country better management has had some influence, then the virulence has decreased.

The diagnosis is never difficult in typical cases, but in the very mild or the fulminating types it is often missed. The average man is too prone to neglect the throat and history in favor of the eruption. A scarlatiniform rash by no means indicates scarlet fever. Drug rashes, toxic erythemas and the second rash of Dengue have been so labeled. It is not unusual for experts to disagree on the diagnosis in some of the atypical cases.

Scarlet fever is particularly rich in complications. Like influenza, its onset is often but the excuse for more damage. Ears, throat, nose, heart, joints and kidneys are commonly attacked. Otitis is said to occur in from 15 to 20 % of the cases. Generally it is preceded by slight symptoms and is of a severe character. Unlike the measles ear, the damage is often permanent. Nephritis ensues in about 7 % of cases. Like the causative disease, though, without any relation to it, it varies markedly in severity.

Many scarlet fever patients are neglected by their physicians in regard to frequent physical examinations. Furthermore, it is not sufficient to examine a specimen of urine, but the twenty-four-hour amount excreted and the fluid intake for the same period should be recorded.

The value of prolonged stay in bed is difficult to estimate, but I believe it is worth while. Diet in all cases should be carefully planned with a view to reducing the protein fraction, and at times the amount of water. Unless the physician is interested in pediatrics or internal medicine he is content with prescribing milk alone. This, of course, is a mistake.

Because the mortality from scarlet fever is high and in as much as the complications often result in permanent damage, it should be our constant endeavor to prevent the child from having it. Although many adults do contract it, yet it is essentially a disease of childhood. In a series of 1,000 cases at the Boston City Hospital, 78 % of the individuals were under eleven years. Furthermore, parents should not proceed on the assumption that the child is bound to have it sooner or later, for only 50 % of children become sick from it. Prophylaxis in general is fairly simple. Early diagnosis with prompt and complete isolation, which includes sterilization of all outgoing articles, is essential. Medical inspection of school children should prevent a pupil's remaining in school who has a sore throat or a headache and vomiting. All statistics tend to prove that much scarlet is spread in the class room.

Unlike scarlet fever, there is unfortunately nothing alarming in the onset of diphtheria. The average individual judges of the severity of any disease by the amount of fever or pain present. The fact that diphtheria frequently gives rise to less constitutional disturbance at least for several days than the ordinary tonsillitis is undoubtedly responsible for many deaths. When asked what medical science has accomplished for humanity, we can point with pride to what has been done in diphtheria. Our knowledge here is more complete than in any other disease. Beginning with the discovery of the organism, in 1883, the introduction of the serum in 1893, and finally the Schick intracutaneous test for immunity, in 1915, we have made great strides in the conquest of this once dreaded disease, which even

as late as 1839 was written of by J. Lewis Smith as "one of the most fatal and unfortunately one of the common maladies of childhood." Today we have bacteriologic aid to diagnosis, we have a specific remedy, a test for immunity, and methods of immunizing. And yet in the registration area of the United States in 1916, over 10,000 people died from it.

Barring the few malignant cases, the accidents incidental to intubation, and the rare pulmonary diphtheria, we certainly should expect to have all our patients recover, provided we are summoned in time. The fault clearly lies in two different directions. First, we have not impressed people sufficiently that in diphtheria time is a most important factor, nor have they been taught that any sore throat may be diphtheria. On our side there are still too many who persist in using insufficient dosage or rely upon the repetition of the injection. In South Carolina the State gives the antitoxin free, so there and in many other states expense to the patient should not figure in the estimation of the number of necessary units. Many physicians who give doses that are too small are luckily fortunate in their results because many cases are very mild.

We must not lose sight of the fact that prior to the introduction of antitoxin at least 40 % of people recovered by their own antitoxic powers. While the subcutaneous or intra-muscular route is good enough for the average case, where we are confronted with a very severe infection or much time has been lost, the intravenous method is imperative and vastly superior. I am convinced that it is not employed sufficiently often.

Today we are relying in many ways entirely too much upon the laboratory. While necessarily it is the supreme court in making the diagnosis, yet in most cases by our clinical methods we should know in advance. I try to classify all my throat cases as surely diphtheria, surely not, or doubtful. No man can be right always, but especially upon our medical students should we try to correct the tendency of leaving it all for the laboratory.

At times I have known the diagnosis to be missed not because the practitioner did not know diphtheria, but because the throat was not examined or because he did not have sufficient light or failed to use a tongue depressor. I consider wooden

tongue depressors as one of the most important instruments that the physician can carry.

It is unnecessary to go into the differential points in diagnosis, though it is not amiss to state that Vincent's angina and syphilis have been mistaken for it.

In scarlet fever it is best to give antitoxin in all cases where diphtheria is suspected. As a rule the diagnosis of diphtheria is correct and the treatment is along correct lines. The contrast between the per cent of deaths in the pre-antitoxin days, 50 %, and only 13 % today, is sufficient proof. However, my contention is that this figure should and must be reduced almost to zero.

There are fewer unsolved problems in diphtheria than in most of the other infections. By the use of the Schick test we have learned the percentages of immune people at different ages. Furthermore, among individuals we know who has sufficient natural antitoxin to prevent the acquiring of the disease under ordinary conditions.

The prophylaxis of this disease is most important. It divides itself readily into two parts: first, defensive as isolation of the patient and destruction of all his secretions; and second, the production of an artificial immunity in the well person, either rapidly by the injection of serum, or slowly by the use of toxin-antitoxin mixtures.

Nothing can take the place of a strict quarantine. Artificial immunity induced by serum unfortunately is said to persist for but three weeks. I, therefore, rarely use it. Our knowledge of the active artificial immunity is not yet complete, though it promises much. It would be better for more physicians to use the Schick test where children have been exposed than to give immediately a prophylactic dose of antitoxin. Formerly in the large contagious hospitals all scarlet fever patients were given prophylactic doses of diphtheria antitoxin. This has been discontinued, at a saving of pain to the individual and expense to the state.

It would lead us too far afield to take up the many interesting complications of diphtheria, especially of the ear, kidneys and neuro-muscular system. Suffice it to say that our medical students can not be too strongly impressed with the fact that the danger in diphtheria does not lie in

the visible local lesion, nor is it of today, but on the contrary it is in the unseen soluble toxin which is anchoring itself to the tissues and the effect of which will be produced next week.

The carrier problem, while recognized, has by no means been solved. It is of tremendous economic importance.

I shall not attempt to include meningococcic meningitis or poliomyeloencephalitis, for while essentially serious infections of childhood, they are far less common than those already considered.

On the whole, then, we must realize that the four common contagions of childhood which I have considered cause directly or indirectly a large mortality. Diphtheria, which is curable, is not yet being properly fought. The problems of measles, whooping-cough and scarlet fever require much more work, or rather results, than so far. In the meanwhile we undoubtedly can do our best work as practitioners by promptly isolating our contagious cases and using all means to prevent their spread. Medicine has made great advances in the control and treatment of the acute infections, but we must and shall go further.

DISCUSSION

Dr. L. W. Elias, Asheville, N. C.—I would like to say in connection with this paper that if we want to have a subject treated concisely, we had better pick out professors of pediatrics, as this paper well illustrates. I do not see how so wide a subject as the one presented this afternoon could have been covered any more thoroughly and satisfactorily than Dr. Pollitzer has done it. He has left very little to be said. He has taken up the infectious diseases of children; has gone through them thoroughly, and has given us clear clinical pictures, and anything I may add will certainly be of minor importance.

One thing that I would like to mention and stress is the examination of the mouth and throat of the child. It is a subject that is constantly emphasized, but never emphasized enough. You will find good practitioners, and good internists, who, when called in to see a baby, neglect to look at the throat. They treat the child for all sorts of things that it has not, whereas a simple examination of the throat would have cleared up the condition. The point should be emphasized again and again that the baby's throat should always be examined.

Another thing: in visiting case after case, we as physicians have a haunting fear that we may carry scarlet fever and diphtheria to somebody else. Not to make us careless, but for our comfort it is well to remember that practically all of the contagious diseases are contracted directly from the patient, or much less frequently from the person who has become a carrier. But the

carrier proposition is hard to get at. If we remember the small possibility of our hands becoming carriers of disease, and if we keep our hands clean, and do not let the patient cough, expectorate or sneeze on us, we have taken the most sensible precautions that we can. It seems thoroughly established that carrying contagion on our clothes is not the principle thing which we have to fear. The other points mentioned are far more important to watch.

Cases of scarlet fever at times are very septic. Here blood transfusion is valuable. Drawing blood out of the vein of a donor and injecting it into the muscles of the patient is easy of accomplishment, free of danger, and effective. This, with the Murphy drip, and like measures, should be employed in all severe cases.

Dr. Oliver W. Hill, Knoxville, Tenn.—There is one thing we have reason to be ashamed of, every one of us, namely, the prevalence of communicable diseases. These diseases are just as prevalent now as when our fathers were practicing medicine. About two years ago I attempted to get some data on this subject and in so doing I wrote to a number of cities. I found the percentage of deaths from diphtheria in Chicago was no less in 1914 than in 1904, despite the fact that they had diphtheria antitoxin and used it, due to the fact that the spread of the disease was not under better control than it was formerly. More diagnoses were doubtless made in 1914 than in 1904.

I believe that something we have to learn more about is carriers and about the communication of these diseases. Dr. Elias said: "Don't let these patients cough on you, but if you have clean clothes and change them now and then it does not hurt if they should cough all over you." I believe the thing will eventually resolve itself in a thorough knowledge of the various factors of cleanliness just as in surgery. We have known for a long time how to prevent puerperal sepsis. We know now it is considered criminal to have puerperal sepsis following a case of obstetrics. With puerperal sepsis we know somebody has been guilty of neglect; he has not washed his hands. I wish more investigation could be made of such factors. We are seeing children with whooping cough and are not as careful as we might be in caring for them.

A Member—What did you say the mortality was from diphtheria in Chicago now as compared with former years?

Dr. Hill—In Chicago it is no better today than formerly.

A Member—There must be something wrong with your statistics. I mean the mortality per thousand from diphtheria.

Dr. Hill—I meant the cases per capita of population of the city.

If an examination of the nose is made in these cases, you will run across nasal diphtheria when you least expect it.

Dr. W. A. Mulherin, Augusta, Ga.—I am very glad Dr. Pollitzer called attention to the high mortality of whooping-cough in the first year of life. This fact is not fully appreciated by the laity and is due in a measure to physicians not impressing parents with the seriousness of this disease in early life.

The importance of oral and faucial hygiene, and free drinking of water, in the treatment of infectious diseases should be especially stressed. I believe scrupulous cleanliness of mouth and throat to be the best preventive against secondary pneumonia in such cases. Take, for example, influenza. We know that the resulting or accompanying pneumonia is due to a mixed infection. Is it not highly probable that the secondary infection gains entrance to the lungs through the mouth? If the mouth and throat are kept as germ-free as possible, it does seem logical that we should expect less pneumonia. Again, take scarlet fever as another example. In this disease we know it to be rare for scarlet fever *per se* to kill. The complications of nephritis, otitis media, cervical adenitis, pericarditis or endocarditis are what give us most concern. If the mouth and throat are kept clean, the Eustachian tube will have less chance to carry infection upward to the ears. The same thing might be said about the cervical glands. As these glands drain the pharynx and nasopharynx, the less infection that exists in these localities the less likelihood there is of enlargement of these glands.

If to oral and faucial hygiene we add the free drinking of water, say a half to one glass every two hours, depending upon the age, we will help in a great measure to avoid the complications of nephritis and cardiac diseases. If it be toxins that cause these complications, then dilution and free elimination appear to be the sensible treatment. The great majority of influenza and scarlet fever patients require no other treatment, except the proper regulation of diet.

As regards the use of antitoxin in the treatment of diphtheria, I think exception should be taken to Dr. Faison's remarks, in the discussion of Dr. Sidbury's paper, when he stated that he would as soon give his little patient poison as to administer a second dose of antidiphtheritic antitoxin. Practical experience and a study of the medical literature will not bear him out in his contention. If I remember correctly, Gillette, of New York, a few years ago reviewed the literature on this point and reported thirty-odd deaths due to supposed anaphylaxis following the administration of antitoxin. In some of these cases the autopsy revealed a status lymphaticus not before suspected. In his series practically all of his cases were adolescents or adults and had previously suffered from hay fever or asthma, caused by contact with a horse.

When we consider the millions of children who have been given antitoxin once, twice, or many times, and the absence of reported deaths due to its administration, it appears that the real and alleged dangers are practically nil. I believe that the consensus of opinion today on this subject is that there should not exist the slightest hesitancy in freely giving antitoxin to a child suffering from diphtheria. A possible exception may arise in those rare cases where the child is subject to asthmatic attacks when exposed to the odors emanating from a horse. In such cases, slowly injecting a few drops at a time of the antitoxin will almost invariably meet with success.

About the dose of antitoxin, it is generally considered better to give one large single dose,

as for example 20,000 units, than to give 10,000 units and repeat the dose in eight or twelve hours. The reason for this is that the antitoxin is slowly absorbed from the subcutaneous tissues and we are losing valuable time when we do not inject the total amount the child needs in the first dose. The mere fact that we have to repeat our dose should be accepted by us as an acknowledgment that our judgment in dosing the child was in error. The use of antiseptic solutions for washing hands in the sick room, in such cases, is worthy of comment. Personally, I do not use them, for they not only do not kill infection, but chap the hands and thereby form an excellent nidus for carrying infection to other patients. If investigation were instituted to determine the germicidal action of the various solutions used, I feel quite sure the result would teach us that not a few minutes, but many minutes, and perhaps a few hours, would be required to kill the germs present in such cases. The generous use of soap and water, and less antiseptic solutions appear to be the most rational mode of procedure as a precautionary measure in infectious diseases.

Dr. I. W. Faison, Charlotte, N. C.—I would not have gotten up if Dr. Mulherin had not mentioned my name in connection with the use of antitoxin. About giving antitoxin in these cases, I believe in tonsillar diphtheria 10,000 units will cure every case. I believe 20 to 30,000 units will cure a case of laryngeal diphtheria if it is going to cure it at all, best given intravenously. I think 20 to 30,000 units of antitoxin is enough to give a child two or three years old with diphtheria. Of course, some of them will die. I have had them die under 40,000 units.

With reference to scarlet fever, I agree with Dr. Pollitzer that half of them do not have it. If these patients are isolated and cared for and watched, it is the best plan of handling them.

In regard to whooping-cough, I believe in the treatment of this disease with vaccines. I believe in giving the vaccines in heroic doses, starting it with two hundred and fifty million and going from ten million to a hundred million or four billion. I have seen the vaccines do good time and again in these cases. The trouble is we do not give enough of the vaccine. After the first ten or fifteen days the patient has given it to all of the neighbors he is going to give it to, and after that time he will probably not give it to any others. I agree with Dr. Dunn, of Boston, in regard to that. At the time you make the diagnosis the patient has whooping-cough; the time for that patient's giving it to somebody else has passed. The damage has been done. The fuel is afire and it burns just the same.

Dr. Pollitzer (closing)—I believe we ought to keep in mind that where one child dies from anaphylaxis a thousand die from lack of antitoxin.

With regard to whooping-cough, I agree with Dr. Faison absolutely that we would probably have better results if we gave the vaccines in bigger doses. While I do not feel absolutely sure that vaccines will cure all cases of whooping-cough, I believe they are certainly worth trying and ought to be helpful.