entered in the book for the purpose, the present state both of the general systems and of the reproductive organs was investigated, and the birth canals measured and examined by the hands and sometimes by the pelvimeter. Thirteen of the women were attending for the first time, and one had been at a previous clinic. In her case there was a history that in previous pregnancies the baby had died a week or two before labour; she was now coming to the clinic each week in order to have the fetal heart counted; the occurrence of any irregularity in the heart will be the signal for admission and the induction of labour; and in the meantime tonic medicines are being administered to the mother and her health watched over.

[A fortnight later this patient was admitted to the prematernity ward as she was growing weaker and suffered from grave depression of spirits; two weeks after this the fetal heart showed signs of failure, and induction was begun; most unfortunately, it was then found that she had absolutely central placenta praevia, and, although she did not lose an excessive quantity of blood, she died soon after delivery from exhaustion. The placenta was markedly diseased as well as praevia. This was the only placenta praevia lost.—Note added September 16th, 1916.]

Of the thirteen new cases, four were found to be normal in practically all respects. To them a few words of advice were spoken, to each a copy of the little green book entitled *Hints to the Expectant Mother on her Health* was given, and each was invited to return should any uncomfortable or unusual conditions develop. Amongst the nine remaining cases there were five in which the pelvis seemed on physical examination to be narrow; two of them were clearly cases for induction of premature labour, and were told to come back in a month and three weeks respectively for this. But the other three were difficult cases on which to decide, and were asked to come in the morning and to be prepared for examination under an anaesthetic. Accordingly on the following day I examined them under chloroform. One (within a few days of term), whose pelvis I found to be too contracted to permit of the delivery of a living child, I operated on by the Caesarean section within a week, and got the best result for both infant and mother. The second I found to be suitable for the induction of premature labour, and a few days later Dr. Oliphant Nicholson, the assistant physician, successfully delivered her of a living 7 lb. baby. The third, a primipara, was discovered to have a pelvis near enough to the normal to justify waiting till the supervention of pains at term.

Four cases were left. One of these women was found to have swelled feet, and a rectum so tightly packed with faeces that she was asked to wait behind after the clinic, was given an enema, and was made much more comfortable than she had been. She had no albumin in the urine and no heart trouble. Another had also swollen feet. In her case it was found that the fetal head was lying low and exercising some pressure; but since there was nothing else abnormal, and since she was near her date of delivery, she was allowed to go home. She was delivered normally a few days later and made a complete recovery. Another of the four had pulmonary phthisis as a complication of her pregnancy, and arrangements were made for suitable treatment outside the hospital. Finally, one woman stated that she had had some bleeding. No placenta could be felt, but she was taken into the prematernity ward, was thoroughly examined, and was watched. As, however, no haemorrhage recurred, and since she was anxious to go home, she was allowed to do so with instructions to return to hospital on the appearance of the slightest show. It had probably been a slight accidental haemorrhage.

The cases attending this clinic were not exceptional in any way; I have had others both much more interesting ones and more dangerous. It will be noted that there was not a single pre-eclamptic patient amongst them. For some unexplained reason eclamptic patients have been rare this summer whilst placenta praevia cases have been wonderfully common (the hospital dealt with nine in July). It was rather a large clinic of quite an ordinary kind. Yet I believe two infantile lives at least were saved, those in the case of two of the mothers who had marked pelvic contraction. In the one instance induction of labour could not very well have been postponed for a day if the child was to be saved; indeed, it weighed 7 lb., and could only be delivered by forceps. In the other case, the choice lay between craniotomy and Caesarean section, but had she, instead of coming to the clinic, appeared first after the

second stage of labour was initiated, I should in all probability have had to do craniotomy. As it was, I was able to fix my time, do the Caesarean section under good circumstances, and secure a living child and a completely convalescent mother. In each of those instances the prematernity beds were useful; they were also valuable in the haemorrhage case; and throughout the whole progress of the clinic one was conscious of their presence as a means of giving treatment, long or short, slight or important, to any woman who might require it.

There was, however, good of another kind, and in another degree, accomplished by this antenatal clinic. Advice was given to fourteen expectant mothers about their own health and their coming child's welfare. Even the four who were normal went away fortified by knowledge about themselves and about the danger signals by which they were to be warned they had not possessed before; several of the others had things done for them and arrangements made which were unmistakably for their future safety and their immediate comfort.

There can be no shadow of doubt that the differentiation of the prematernity work of a maternity hospital into a special department is a valuable advance in the obstetric hospital system of the country; even the giving to the ward, the clinic, and the patients the distinctive name of "prematernity" increases the respect with which the work is viewed and carried out by residents, sisters, and nurses, and it is an immense boon to the expectant mothers to know that they are not only always welcome, but have an inalienable right to attention in the department which is so named and set aside. Both prematernity beds and antenatal clinics are of great value, but they must exist alongside of each other in a maternity hospital if their full benefit is to be secured; they and their associated means and medical and nursing staff must be welded together into a prematernity department if they are to be really helpful. The most important, the central and essential part, without which all the other parts fall short of entire success, is the prematernity ward in the hospital.

SOME PRINCIPLES OF INVESTIGATION IN BLOOD-PRESSURE PROBLEMS IN HEALTH AND DISEASE.

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A STUDY of the literature of blood-pressure measurements cannot fail to impress the reader with the lack of method shown by some clinicians in the choice and arrangement of their observations. A measurement of blood pressure—in most cases the systolic—is chosen as an item in the routine examination of the physical features of a clinical case. Let us consider what knowledge is really obtained by taking the systolic blood pressure. The information obtained is no more than that during the period of observation the systolic pressure was equal to the weight of a column of so many millimetres of mercury; it may be a high blood pressure, it may be a low blood pressure, or it may be a normal blood pressure during systole. When the systolic pressure only is estimated, the maximum height to which the pressure rises during so many beats of the heart is given, but nothing whatever is shown as to how far it sinks during diastole, nor as to the extent of the swing of pressure between each diastole and each systole of the heart. In the laboratory to record the blood-pressure changes with the maximum manometer alone would be at once recognized as futile.

In recent years some observers have added an estimation of the diastolic pressure, and by subtracting the prevailing diastolic pressure from the prevailing systolic pressure a record of the pulse pressure range is obtained. To these data they have added observations on the rate of the heart beat and the rate of the respiratory rhythm.

When this information is available we have an isolated picture of the heart's activity, and can say that each contraction of the left ventricle is able to add to the existing diastolic pressure a certain increment of pressure, that this increment of pressure delivers a shock to individual organs, for example, the kidneys; that this shock is borne by the walls of blood vessels which are already under a certain measured existing and permanent strain, the diastolic pressure.

Such measurements are complete, but a thorough knowledge is not thus attained of the circulatory phenomena involved in any disease when such observations are carefully made and carefully recorded from day to day.

The feature to be studied in the circulation in health and in disease is the power of the heart in conjunction with changes in the peripheral blood field to adapt itself quickly and efficiently to extra strain. In health every one is constantly making calls on the power of the heart and peripheral field to adjust themselves either to extra strain or to diminished strain. Consequently, although advance is made when the scope of the measurements of the clinicians is broadened from isolated measurements of systolic pressure and pulse-rate to that of systolic, diastolic, pulse pressure range, rate of heart beat, rate of respiratory rhythm, these measurements are still measurements made under the uniform conditions of repose on a bed in a hospital ward.

Physiologists appreciating this point have published observations of blood pressure before and after muscular exercise in healthy subjects. Thus Pombrey has made a series of interesting observations. Records have been taken of blood pressure before and after running and before and after the lifting of heavy weights. Such observations, though useful, are also incomplete, because they do little more than serve to show what changes have taken place in the blood pressure after the exercise is over. They vary with the power of the circulatory system to adapt itself quickly to the change from activity to repose. As all measurements take time to perform and as the circulatory system in healthy individuals has great power of rapid adaptation, the conclusions drawn from the measurements are apt to be vitiated.

Consequently if a satisfactory knowledge of the heart and peripheral circulatory system in the human subject in health and disease is to be gained, it is necessary to examine and record the changes in systolic, in diastolic, pulse pressure range, rate of heart beat, rate of respiratory rhythm, during the strain thrown on the heart by exercise, not after it is over. The systolic pressure can be estimated during exercise either by the auditory or the tactile index, but the diastolic index is estimated by the auditory index alone. Consequently it is best, perhaps, to adhere to the auditory index for both measurements. Previous to the outbreak of war I had found in Aberdeen that it was possible to get satisfactory observations of systolic pressure, diastolic pressure, rate of heart beat, and rate of respiratory rhythm in a series of medical students who kindly volunteered their services. As the auditory method is used the work done must be such that the arms of the individual tested should be reasonably rigid and that the exercise should produce as little noise as possible. The subject was placed on his back on a polished table and the exercise consisted in rhythmically drawing up his feet and legs as in swimming on the back. The mildness of this exercise depends on the length of time that it is kept up.

It was thus possible to draw graphs of the systolic and the diastolic pressure, with observations on the rate of the heart beat and the rate of respiratory rhythm during the exercise. It is true that the observations of systolic and of diastolic pressure cannot be made simultaneously, especially with increased rate of heart beat. But when such observations are numerous, and are plotted alternately over a considerable period, the importance of taking them simultaneously is practically *nil*.

Such graphs give a true picture of the response of the heart and of the peripheral system to a given amount of work over a given period of time. We can trace how the circulation as a whole adapts itself to the changed conditions.

It is also possible to examine the circulatory phenomena during exercise in the erect posture by the auditory method. The exercise employed was the working of a heavy but silent lathe with one foot. Such graphs enable us to see how the heart adapts itself to gravity and to exercise simultaneously, and from such graphs the efficiency of the mutual adjustments of the heart and of the vasomotor system can be tested.

The ranges of blood pressure, both systolic and diastolic, in healthy and in unhealthy subjects vary greatly. It is obvious, then, that the response to a given amount of work of normal adults with a blood pressure of, say, 130 systolic, 75 diastolic, and a rate of heart beat, say, 78, should be investigated. Having established the normal graphs, the investigation should be carried on cautiously to people

with abnormal systolic and diastolic pressures. By so doing we may learn to appreciate what is the real significance of any abnormal blood pressure range.

Translating these problems into more concrete form, we may ask how a subject, whose diastolic pressure is originally high, fares when tackling a given amount of work. We know that, theoretically at least, he starts with the disadvantage that a considerable amount of cardiac energy in excess of the normal has to be spent in opening the aortic valve. Or we may take the case of aortic incompetence with initial high systolic pressure and initial low diastolic pressure, and ask what series of blood pressure changes take place during exercise. Does such a case develop during exercise a high diastolic pressure in spite of incompetent valves? I put these questions simply to show that in the whole of the literature of blood pressure we have no guide to the true significance of blood pressure ranges which depart from the normal. We have never isolated these departures from the normal and tested them against the performance of a given carefully graduated amount of work. We do not know how Nature has adapted both the heart and the peripheral circulatory system to overcome initial defects. We may state that breathlessness on exertion is a cardinal symptom, but has the case developed this breathlessness on exertion because the heart has failed or because the adjustments of his peripheral circulatory system can make are inadequate?

Enough has been said to show what problems await solution. But by the method of graphs taken during exercise, with the exercise carefully graduated so as not to be injurious in diseased conditions, we may hope to learn something of what is meant by vague terms such as "circulatory equilibrium is restored."

It should be clearly understood that until we know the significance of various levels of pressure, systolic and diastolic, with various rates of heart beat and respiratory rhythm, a mere chronicling of measurements in countless clinical lectures is without significance.

I have carefully refrained from stating what were the results of the investigation made by this method on healthy students because the war has prevented me from checking and rechecking the observations. Enough was accomplished to show me that the method was useful, and that further experimental methods could be applied to it, such as varying the mixture breathed and the temperature of the surroundings. Consequently the influence of such factors as are involved in ventilation problems could be examined.

SEPTIC ENDOCARDITIS: INTRAVENOUS INJECTION OF EUSOL: RECOVERY.

BY

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THE following case, in which recovery from what seemed to be a hopeless condition followed the intravenous injection of eusol, is worthy of record.

A girl of 13 developed erysipelas of the right foot on December 17th, which spread halfway up the shin and disappeared in a week.

On January 6th a systolic murmur could be heard over the precordium, which was considered to be pericardial in origin; it was accompanied by slight pain. Under treatment with sodium salicylate and bromide, the pain and murmur disappeared by January 25th, and the patient was apparently making an uneventful recovery.

On January 28th she had a severe rigor, with sudden dyspnoea and intense precordial pain, accompanied by hacking cough, with a small quantity of sticky mucus. Scattered crepitations were to be heard over both sides of the chest at the back. The temperature was 102°, and the pulse 166. A diagnosis of ulcerative endocarditis with pulmonary embolus was made.

On January 29th the temperature was 103°, the pulse 146, and she had a slight rigor; 25 c.cm. B. and W. antistreptococcal serum (ulcerative endocarditis) was given hypodermically. The temperature fell to normal within twelve hours, and her general condition was much improved.

The improvement was maintained for a week, but on February 8th the pulse and temperature began to rise, and her general condition was not at all good.

On February 11th there was a rigor; the temperature was 103°, the pulse 148, and there were pain, tenderness, and swelling of the left elbow. A profuse petechial septic rash appeared on the legs and rapidly spread over the body, and a bed sore formed.

On February 12th the serum was repeated (50 c.cm.).

On February 13th, 14th, and 15th, the temperature was