THE STATE AND PRE-NATAL HYGIENE.*

BY

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SUFFICIENT information is already available to show how important an element in the problem of child welfare is the period when the child is wholly dependent for its continued existence on the health and well-being of the mother. But while ante-natal care is not only as important as post-natal, it implies inquiry into conditions which have little similarity with those properly belonging to the later period. The field, indeed, is primarily clinical and pathological, and some indication of the importance of these is afforded by the mortality of the first four weeks of life. It will be useful, therefore, to look at these for a moment.

The infant death-rate is usually stated per 1,000 births in the same year. This rate for Scotland in 1917 was 107, but in the larger burghs it averaged 124, and in the county districts 88. In the same year the highest rate in individual towns was—139 in Aberdeen, 137 in Dundee, 132 in Perth, 128 in Glasgow, Falkirk and Kilmarnock 125, and 123 in Edinburgh.

From this general statement, however, we obtain no indication of the wide difference in the rate between the early and later months of the first year of life, and it is only by considering this that we are led to understand the predominant part played by ante-natal causes.

Suppose, for example, we distribute the deaths according to the period of their occurrence under three months, under six months, and under twelve months, and state them as ratios of the total births, this is what we get (taken from the Glasgow report):

Glasgow Death-rate, under 3, 6, and 12 Months per 1,000 Births.

	-3 months.	-6 months	-12 months.	1st Year.
1870-2	72	31	67	170
1880-2	65	25	58	148
1890-2	70	25	54	149
1900-2	72	26	47	145
1918-10	63	23	44	130
1915-17	61	22	43	126
Percentage reduction 1870-1917	15	29	36	26

Despite much that has been said to the contrary, the infant death-rate on the whole has been falling during the last forty-five years, but it will be observed from the table that in the second half of the first year the reduction is proceeding at a much greater rate than during the first three months (36 per cent. against 15). More important still is the indication that the fall in the first three months did not become manifest until the present century began. The reasons for this cannot be discussed here, but may be related to the marked improvement in the economic condition of the people in the last quarter of the nineteenth century. In any case this fall has been sudden rather than gradual as in the others. Moreover—and especially in the years from 1890 onwards—about half of the deaths occurring in the first year take place in the first three months.

In relation to our special problem the deaths during this first trimester are of most importance, and analysis shows—

1. That two-thirds of the deaths under three months occur during the first month;
2. That in the first week the deaths in both sexes are four times more numerous than in the second week, and about six times more numerous than in the fourth week after birth.

We are thus led backwards from a consideration of the total infant deaths through an increasing monthly number until, as we approach the portal of life, the trap-doors—adopting for the moment Addison's simile in the "Vision of Mirza"—become so numerous that about one-third of the children who are to die before completing their fifty-second week will be already dead ere the fourth week is completed.

In view of this enormous proportion of infant deaths occurring during the first week, let us ask a further question regarding the proportion of those who fall short of the Registrar-General's standard of living and are born dead. We know, for example, that children born dead form fully 4 per cent. of the total births, a proportion in Glasgow representing approximately 1,200 annually.

Here, then, at the threshold of our inquiry, we have 4 per cent. of our births stillborn, a rate which for Scotland means nearly 4,000 a year; and, if we add to them the number of children born alive but dying within four weeks of birth, we have the first illustrations, on a considerable scale, of the work which lies to be done by an organized system of ante-natal care.

The case for ante-natal supervision for these purposes alone is much strengthened by considering the causes to which these deaths during the first month of life are ascribed, for they lead us directly to the period antecedent to birth, and away from the direct influence of environment, as the term is commonly used. This aspect of the question was discussed by the medical officer of health of Glasgow, in a report submitted to the seventeenth International Congress of Medicine held in London in 1913, from which I may quote:

I suggest (says Dr. Chalmers) the term "immaturity" as the simplest method of expressing the inability of the child to live apart from its mother, and would include within it all deaths occurring during the first month, and ascribed to premature birth, congenital defects, atelectasis, atrophy, and debility or wasting diseases.

None of the other causes of death in the first month seem to me to have the same significance as those belonging to this group, and it is to the gynaecologist, I think, that we must look for some elucidation of the problems they suggest. Of all the other principal groups of disease which I have quoted, they alone gain more than a relative prevalence during the first month. And I doubt whether even this grouping under the term "immaturity" represents the full volume of what, for want of a more intimate knowledge of the causes, we can regard at the moment only as physiological misfits.

GLASGOW: Deaths from Several Causes in each of the First Four Weeks, and Under One Year, per 1,000 Births (Three Years October, 1909—September, 1912).

Total Births 65,325
MALES.

	Weeks.					Under One Year.
	1.	2.	3.	4.	5-4.	
1. Immaturity	22.34	4.22	3.38	2.10	32.03	42.84
2. Diseases of the respiratory system	0.54	0.42	1.11	0.87	2.95	30.38
3. Diseases of digestive system	0.48	0.57	0.78	0.72	2.56	22.43
4. Diseases of nervous system	0.63	0.51	0.33	0.21	1.69	8.88
5. Tuberculous diseases ...	0.03	—	0.03	0.03	0.09	6.99
6. Accidents at birth	0.60	0.03	0.06	—	0.69	0.69
7. Infectious diseases	0.03	0.03	0.06	0.18	0.30	15.92
8. Syphilis	0.06	0.12	0.21	0.15	0.54	1.96
9. Suffocation	0.21	0.18	0.06	0.09	0.54	1.26
10. Other violence	0.12	—	—	0.03	0.15	0.63
11. All other causes	2.11	0.81	0.51	0.36	3.79	10.90
Rate per 1,000 births ...	27.15	6.89	6.53	4.74	45.33	142.88

Stillbirths and deaths from immaturity, although the most tangible sources from which illustrations may be drawn, very inadequately represent the total volume of life lost during ante-natal states. Miscarriage is, in many instances, a perverted habit beginning most probably in disease or injury, but repeating itself in recurring pregnancies. The potential life lost in this way cannot be stated with any approach to accuracy.

Other phases of the ante-natal problems, for example, the occupation of mothers, the effect on mother and child of rapidly following pregnancies, the influence of alcohol, syphilis, and drugs, all require concerted inquiry.

The problem of child life is, however, only one part of the subject of ante-natal care. Puerperal sepsis in Scotland causes over 200 deaths annually; convulsions fully 100; abortions rather less than 100; and all other forms of

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illness during pregnancy frequently ending in the death of the mother about 270 annually—in all, just under 700 deaths of mothers, on the average of three years, 1914–16. Puerperal convulsions, we are assured, are wholly preventable if the antecedent condition is treated in time, and it is likely that were the conditions under which the others arise wholly in view from their onset, we should be able to anticipate a reduction in them also.

It is, in my opinion, the distinct duty of the State to give earnest heed to the whole position of maternity, both pre-natal and post-natal, and this not only in its own interest and the interests of the empire, but also in the interests of the mothers themselves, who, if in straitened circumstances, as too many of them are, should be assured of all the medical skill and nursing facilities that are accorded to their more fortunate sisters in the higher grades of life.

The larger towns have maternity hospitals, and occasionally ante-natal beds are to be found in them; ante-natal dispensaries are just coming into being. But they have not yet fully enlisted the active interest of the general body of medicine, and without the active help of the general practitioner I am of opinion than any scheme will have difficulty in materializing.

But in order to co-ordinate all the functions of medical adviser, nurse, and welfare visitor, welfare centres are an absolute necessity, and they must be numerous enough to be available to every group of the industrial population. The dispensary should lead where necessary directly to a hospital bed, while the dispensary and hospital staff should be drawn from the practitioners and consultants of the district.

All this is the work of local organization, but there is a phase of the question which requires direct State help, not only of a financial character. When we think of ante-natal hygiene each one has in a general way a conception of healthy maternal life, but the point at which changes in physiological processes begin to lay the seeds of definite disease are by no means well understood, even by the general body of medical men, and I believe the State might greatly help in this direction by appointing a commission to inquire into the whole question of ante-natal pathology, with a view to determining in a precise form at least some of the data upon which a doctrine of ante-natal hygiene may be based.

THE EXERCISE BLOOD PRESSURE TEST OF MYOCARDIAL EFFICIENCY.*

BY

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THE variations of the blood pressure induced by muscular exercise have been recorded in series of cases by many observers, with a view to establishing a reliable index of myocardial efficiency. Conflicting opinions have been expressed as to the value of the test, for reasons upon which I shall presently touch.

Among those who have recorded their observations one may mention Dr. Strickland Goodall of London, Sir Clifford Allbutt and Dr. Michell of Cambridge, and Drs. Graupner and Baur of Naheim. Michell found that in athletes the blood pressure varied from 95 to 100 mm. Hg in the early morning to 125 to 130 mm. Hg two hours after hard exercise. Baur found that in normal subjects exercise caused a rise of 5 to 10 mm. Hg, followed by a fall of the same degree. The chief difficulty with which all observers have to contend is that the blood pressure cannot be taken at intervals during natural exercise, because no sensitive instrument would stand the wear and tear. It is true that the blood pressure has been estimated under somewhat unnatural conditions, as in Valsalva's experiment and in Baur's observations on men pedalling on a stationary bicycle with loaded brakes. But for the most part observers have contented themselves with making records of blood pressure before exercise, immediately after exercise, and at intervals after exercise. During the present military work one meets with so many cases of disease or disorder of the heart that the opportunity of

comparing the results of the exercise blood pressure test with the results of ordinary clinical examination is one not to be missed.

Accordingly I have applied the test to several cases of "D.A.H." (disordered action of the heart), and I regret that lack of time has prevented me from applying it to a larger number of cases, and more frequently in each individual case. In making my observations I have followed the methods of Dr. Strickland Goodall, with certain modifications. Two grades of exercise have been used: (1) Walking up and down a long corridor several times at a quick pace; (2) running up and down twenty stairs once or twice.

The instrument used was Martin's modification of Riva-Rocci's sphygmomanometer, and the method employed was the combined auditory and tactile—that is, in addition to the usual armlet, a second armlet carrying the chest piece of a stethoscope was applied over the brachial artery. The blood pressure, pulse, and respirations were taken before exercise and at intervals after exercise. The pulse and respirations were counted by Sister Sheridan of my wards while I was estimating the blood pressure.

Dr. Goodall¹ states that for practical purposes the results of his observations may be classified as follows:

1. *Good Reactions*.—Pulse, respirations, and blood pressure all increase and are normal again at the end of three minutes. (From context, "normal" means previous level or rate.) These reactions are characteristic of well trained healthy hearts.

2. *Fair Reactions*.—All cases in which pulse, respirations, and blood pressures go up on exercise, but have not returned to normal at the end of three minutes. Their return is, however, along normal lines.

[Note.—The pulse-rate is the one that usually remains raised, and much importance attaches to the time for which the increased frequency is maintained.]

These reactions are characteristic of the physiological but poorly trained or atonic hearts of persons of sedentary occupation. Nicholson, in his book, *Blood Pressure in General Practice*,² states: "With cessation of the exercise both blood pressure and pulse will in a short time return to their previous level, the pulse-rate a little before the blood pressure. In myocarditis cases, if mild, there will be an elevation of blood pressure and an acceleration of the pulse-rate, but the blood pressure in a short time will fall below its previous level, while the pulse-rate remains higher longer."

"In some severe cases the blood pressure will fall from the start, the pulse-rate increasing, the blood pressure rising to its previous level only after a long time."

Goodall groups these severe cases of myocarditis under his two remaining types of reaction:

3. *Bad Reactions*.—The blood pressure fails to rise, although the pulse and respiration go up.

4. *Very Bad Reactions*.—Pulse and respirations increase, but the blood pressure actually falls.

He states that "bad" and "very bad" reactions are typical of hearts in which the myocardium has been damaged by inflammation, strain, or degeneration.

I show first on one chart four imaginary observations, illustrating the four types of reaction which have been just mentioned, namely: (1) Good, (2) fair, (3) bad, (4) very bad. If we agree to adopt Goodall's standard, such a chart serves as a rough foot-rule, which can be applied to charts made from our own observations. Goodall does not state the diastolic pressure in his cases, and I infer that he did not employ the auditory method.

So far as I am aware, no very accurate estimation of the diastolic pressure can be made by tactile or visual methods. In my cases I have included the diastolic pressure as a matter of interest. Since the systolic pressure is approximately the intraventricular pressure and the diastolic pressure is the peripheral resistance, the difference between the two is the pulse pressure, that is, the pressure driving the blood on and through the arterioles.

Strasburger found that after exercise the systolic and diastolic pressures stand in no constant relation to one another. But estimation of diastolic pressure is important in at least two ways: (1) Rise of systolic blood pressure may be due to (a) increase in systolic output and concomitant increase in tonicity; (b) stimulation of vaso-constrictors centre (unfavourable). In the latter case there should be rise of diastolic pressure. (2) When systolic and diastolic pressures approximate, cardiac power is poor.

The great value of the test is obvious, if we can depend upon it to give us accurate, reliable information as to myocardial efficiency. We know that "D.A.H." is a comprehensive term embracing a large variety of disorders of the heart, but I assume that in the main our object is

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