persistent phlegmasia (twenty-one cases); chronic arthritis and rheumatism (eleven); recurrent tonsillitis (six); urticaria (two); chronic iritis (two); and chronic endocarditis (two). They had in common the fact that there was no history or record of their existence before the puerperal infection. Some were the easily recognizable direct result of the original illness, as, for example, persistent swelling of the legs and fixed joints resulting from septic arthritis. In the others a reasonable theory of origin could be traced in the existence, in all, of a focus of sepsis in the reproductive system.

Bacteriology

In the great majority of patients the infecting organism at the primary puerperal illness was the *Streptococcus haemolyticus*, but in no instance did bacteriological examination demonstrate this organism in the vagina at the time of the investigation.

Summary and Conclusions

An investigation into the maternal morbidity following puerperal sepsis, and the resulting disability, is made in a series of 200 cases.

In only a small percentage of cases is the subsequent health of patients recovering from puerperal sepsis severely affected; but some mild invalidism is to be expected.

Prominent gynaecological sequelae to puerperal sepsis would appear to be sterility, increased incidence of abortion, and a higher incidence of puerperal sepsis affecting future confinements.

Chronic infective lesions of the reproductive organs were commonly found as a direct result of primary puerperal infection, while many affections outside the reproductive tract appeared to bear a definite aetiological relationship to the original infection.

I wish to thank Dr. John Watson, superintendent of Robroyston Hospital, for providing every facility for the investigation, and also the nursing staff for their generous assistance. I am especially indebted to Dr. M. A. Foulis for his invaluable criticism, and I am grateful to Professor Hendry and Professor Baird for their interest and help.

REFERENCES

- Kenny, M. (1937). *Lancet*, 1, 14.
 McLroy, L. (1935). *Publ. Hlth.*, 48, 262.
 MacLean, E. (1935). *British Medical Journal*, 2, 656.
 Ministry of Health: Final Report of Departmental Committee on Maternal Mortality and Morbidity, 1932, Chap. VIII, p. 122, London.
 Report of the Medical Officer of Health, City of Glasgow, 1936, p. 84.

The *Handbook on the Welfare of the Blind in England and Wales* was compiled under the aegis of the advisory committee appointed by the Minister of Health. It has now been revised and brought into line with recent legislation in a third edition, to which the Minister, Dr. Walter Elliot, contributes a preface. The handbook contains detailed information relating to the services for the welfare of the blind, including a special chapter on the provisions of the Blind Persons Act, 1938. Among the various appendices will be found information on such subjects as old age pensions and national health and unemployment insurance in relation to the blind, State and other grants for the blind, and a summary of legislation. The handbook constitutes a useful manual for the guidance of the councils of counties and county boroughs who are charged with the duty of providing for the welfare of blind persons, of the voluntary associations for the blind, and other interested bodies or persons. It may be obtained, price 1s., from H.M. Stationery Office, York House, Kingsway, W.C.2, or through any bookseller.

ADULT SERUM IN A SCHOOL EPIDEMIC OF MEASLES

BY

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The use of adult serum in measles epidemics in public schools is still on its trial; there is not yet sufficient evidence to prove its practical value in this particular field or to make an authoritative statement as to the best way of employing it. For this reason any careful attempt to use this serum is worth recording, whether the results be good, bad, or indifferent; much can be learned from the mistakes and failures of others, and something may be added to the sum of recorded experience.

The first two cases of measles at Haileybury College occurred on May 4 and May 6, 1938, respectively, and, so far as could be ascertained, were independent of each other. The latter case, which occurred in the sixth form, did not lead to subsequent cases. There were in all 530 boys in the school, of whom 139 (26.2 per cent.) were presumed to be susceptible to measles in view of their negative history as regards previous attack. Of these 139 no fewer than 120 developed measles—that is, 86.3 per cent. In addition, five boys with histories of having had a previous attack (four of them in infancy, and one, a doctor's son, five years previously), and who therefore did not receive serum, developed measles of average severity. Among the 129 presumed non-immunes, twenty-three (16.5 per cent.) received no serum for one reason or another; these, together with the five who had second attacks, accordingly serve as controls. Of the remainder, 115 (82.7 per cent.) received 20 c.cm. of adult serum, while to one boy 5 c.cm. of convalescent serum was given at his private doctor's request.

The serum was administered to the first series of contacts between the fifth and the seventh day after earliest known exposure, which was reckoned from the appearance of the first symptom of the disease in the primary case. The date of exposure of the contacts to the first two cases was known with considerable accuracy; eight cases of measles occurred among these, of which one had not been inoculated. Only partial success was achieved in discovering and injecting all the contacts of these eight infecting cases, as no fewer than ten out of the next twenty-five cases of measles occurred in boys in whom no contact had been suspected, and who therefore had not been inoculated. As the epidemic was observed to spread with no readily defined limits, it was decided to inoculate the remainder of the presumed non-immunes as early as practicable, irrespective of whether contact was known or not. For this reason wide fluctuations were encountered in the intervals between the time of inoculation of serum and the onset of measles.

Results of Serum Administration

An attempt was made in this study to arrive at a direct comparison between the inoculated group and the controls, using for the purpose the data of height and duration of fever, degree of modification of attack, and incidence of complications.

TABLE I.—Degree and Duration of Pyrexia

	No.	Average Duration	Highest Temperature						
			105°	104°	103°	102°	101°	100°	Normal
Controls ..	28	4 days	2	11	10	3	2		
Inoculated ..	96	3 „	3	18	38	19	12	4	2

However, the average duration of pyrexia observed, which includes the prodromal period, may not be of great importance, since only a portion of the total came under observation during the prodromal period. The daily recording of temperature of all non-immunes at risk was found to be impracticable.

TABLE II.—*Comparative Incidence of Complications*

Complications	Inoculated Cases (96)	Controls (28)
Otitis	1	1
Bronchitis		1
Laryngitis	1	1
Tonsillitis		1
Encephalitis		1
Diarrhoea	2	
Total	4 (4.16%)	5 (17.9%)

Although the complications, including encephalitis, were mild and never constituted a threat to life, their greater frequency among the controls suggests that the serum was probably responsible for the more favourable results in the inoculated group.

Clinical observation and opinion cannot be readily reduced to statistical terms; nevertheless the following estimate of the severity of the disease in those attacked in both groups is given for what it is worth.

TABLE III.—*Degree of Illness*

	Inoculated (96)	Controls (28)
Severe	0	18 (64.3%)
Average	25 (26%)	6 (21.4%)
Mild	36 (37%)	4 (14.3%)
Very mild	35 (37%)	0

TABLE IV

Onset of Measles after Inoculation	Severity of Attack		
	Average	Mild	Very Mild
3-5 days	2 (the worst)	2	4
6-11 "	7	14	13
12-16 "	7	7	8
17-33 "	9	11	11

The average time of onset of measles after injection, taken from the appearance of the rash, was fourteen days. An analysis of the injected cases was made in order to determine if the severity of the attack was related to the interval elapsing between inoculation and onset, and revealed no difference (Table IV).

Discussion

The epidemic in my experience was a comparatively mild one, although some of the cases were quite sharp attacks. This may be attributed partly to the excellent weather prevailing at the time of the epidemic and partly to the avoidance of overcrowding, which was facilitated by the ready co-operation of many of the parents, who took their boys home early in the disease; for instance, sixty-four boys left the sanatorium within a week of onset. Although as many as 101 patients were under treatment at a time, the epidemic lasted as long as seven weeks. By

the end of that time all but 13.7 per cent. of the presumed non-immunes had suffered attack.

The results described here are less favourable than those recorded by different workers in recent measles epidemics, but in certain material respects they are not strictly comparable. Judging from the clinical condition of the first seven cases inoculated, in which the exposure-inoculation period was known, and which subsequently developed measles, it appeared that the degree of attenuation of attack obtained was not so pronounced as that recorded by other workers (L.C.C. Measles Report, 1937; Hobson, F. G., *British Medical Journal*, 1938, 2, 171). There seems little doubt that a dose of 20 c.cm. is too small for boys between 14 and 17 years old, and in all probability the interval of five to seven days between injection and exposure is too long; but it is questionable whether one should give such a large amount as 40 c.cm. of the serum, as is advocated in the dosage scheme of some workers. No ill effects were observed from injection of 20 c.cm., except transient stiffness for twelve to twenty-four hours.

Apart from difficulties in connexion with dosage, another reason why this prophylactic agent has not been widely adopted in public schools is the impossibility of gauging the time of infection with any accuracy. If the outbreak could be confined to a house or form the difficulties would be minimized, but every school doctor knows that there are many loopholes whereby infection may be spread despite the utmost vigilance.

Conclusion

In spite of the rather poor results on paper, I am convinced that, after making full allowance for the influence of weather and other factors, adult serum, even in the small doses used, exerted a beneficial effect, as shown by a less severe illness and a diminished incidence of complications in the majority of the inoculated cases, compared with the unprotected cases. This epidemic was more free from complications and anxieties than any of its predecessors, a view shared by the nursing staff and by all house masters of experience.

Summary

An attempt is made to assess the practical value of adult serum as a prophylactic agent in measles.

Two groups of measles patients in a public school were investigated—ninety-six inoculated, and twenty-eight uninoculated who served as controls.

The height and duration of pyrexia, degree of illness, and incidence of complications in the two groups are compared.

The findings of the investigation are discussed.

Diagram of the outbreak.

I am much indebted to Dr. J. A. H. Brincker of the London County Council for the supply of the serum, and also to Drs. Gunn and Henderson of the L.C.C. for their helpful advice and criticism.