

The London epidemic of small-pox.

Contributors

Edward Jenner Society.
London School of Hygiene and Tropical Medicine

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OF
SMALL-POX.

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THE LONDON EPIDEMIC OF SMALL-POX.

THE following statistics of the numbers of attacks, deaths and fatalities of the epidemic, in cases, the results of which were complete, either by death or by recovery, and which occurred during the year 1901, are taken from a report by the Statistical Committee of the Metropolitan Asylums Board published in various London papers on January 13th, 1902.

SUMMARY.

	<i>Attacks</i>	<i>Deaths</i>	<i>Fatality</i>
Vaccinated ...	760	108	14·21
Doubtful ...	63	41	65·08
Unvaccinated ...	194	98	50·52
Total ...	1017	247	mean 24·28 per cent.

From the facts as they appear in this Summary, it is evident (1) that the severity of the attack and consequently the risk of a fatal result is three and a half times as great in the unvaccinated as it is in the whole group of "vaccinated," leaving out of consideration *when* and *how* they were vaccinated, and (2) that if *fatality* is taken as a criterion, it is probable that of those classed as "doubtful"* in regard of their having been vaccinated, the great majority were either unvaccinated, or if they had been at some time vaccinated, it must have been so remote or the operation must have been so imperfectly performed that they were no better protected than if they had been unvaccinated.

The real bearing of these considerations is made much more evident when the figures are arranged according to age periods, as in the following table:—

Ages.	Vaccinated			Doubtful			Unvaccinated			Total Cases & Deaths		
	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.	Cases	Deaths	Mortality per cent.
Under 1 ...	...	...	...	...	...	...	17	15	88·23	17	15	88·23
1 to 5 ...	1	..	..	2	2	100·00	44	24	54·54	47	26	55·22
5 ,, 10 ...	11	..	..	4	4	100·00	34	13	38·20	49	17	34·69
10 ,, 15 ...	42	1	2·38	3	1	33·33	41	14	34·14	86	16	18·60
15 ,, 20 ...	107	2	1·87	3	...	...	25	13	52·00	135	15	11·11
Total under 20	161	3	1·87	12	7	58·33	161	79	49·07	334	89	26·64
20 to 25 ...	132	13	9·85	8	3	37·50	9	4	44·44	149	20	13·42
25 ,, 30 ...	141	15	10·64	5	4	80·00	10	5	50·00	156	24	15·38
30 ,, 35 ..	96	17	17·71	8	4	50·00	3	3	100·00	107	24	22·43
35 ,, 40 ...	76	22	28·85	5	3	60·00	3	2	66·67	84	27	32·14
40 ,, 50 ...	102	27	26·47	14	12	85·71	6	5	83·33	122	44	36·06
50 ,, 60 ...	12	8	19·05	5	3	60·00	1	...	—	48	11	22·92
60 ,, 70 ...	10	3	30·00	3	2	66·67	1	...	...	14	5	35·71
70 ,, 80 ...	..	...	...	3	3	100·00	...	...	...	3	3	100·00
Total between 20 and 80	599	105	17·52	51	34	66·66	33	19	57·57	683	158	23·13
Grand Total	760	108	14·21	63	41	65·08	194	98	50·52	1017	247	24·28

* Those included in the "doubtful" group were alleged to have been vaccinated in infancy, but no vaccinal scars could be detected in them, either from their being concealed by the Small-pox eruption, or from their being obliterated, or from vaccination never having been really performed.

The lesson as to the protective influence of vaccination which is roughly indicated in the "Summary," will be seen to be much more emphatically enforced in the foregoing Table, from which it appears that though a little more than 14 per cent., or about 1 in 7, of the so-called "vaccinated" class, as a whole, died, that fatality was almost confined to those who were over 20 years of age, who contributed no less than 105 to the total of 108 deaths. Or, in other words, up to 20 years of age the fatality was only 1·87 per cent. Then from 20 to 30 years it increases to 10·25 per cent., whilst from 30 to 40 years it jumps up to 22·61 per cent., a fatality which in those over 40 years of age is still further increased to 46·77 per cent., though even this is less than the mean of all of the age groups of the unvaccinated.

Is there any possible way of explaining these facts except by the assumption that there must have been some influence operating in this class which, whilst very strong in the early years of life, gradually ceased to operate as age increased?

There are only two influences which can be suggested to account for this gradation. One is youth, the other is vaccination.

The influence cannot have been youth, because, if we turn to the age groups of the unvaccinated, we find that the proportion of attacks in the earlier ages is much greater than in the later ones, whilst their relative fatality is much about the same, except in the very young and the very old, in which it is excessively high.

There seems, therefore, to be no possibility of avoiding the conclusion that the influence which so largely protected the young in the vaccinated group (when compared with the unvaccinated) not merely from attack but from a fatal result when they did happen to be attacked, was vaccination.

It may be well to note that the mean fatality of 24·28 per cent. of the whole 1017 cases, as given in the summary, is probably higher than that of the whole number of cases that have occurred up to the date to which these statistics are made up (31st December, 1901) will eventually turn out to be. For, whilst these tables only take account of cases completed by death or recovery, there were a large number of other cases in the hospitals at the time, most of which would probably recover. When these recoveries are hereafter taken into account it will probably be found that the general fatality will be less than 20 per cent.

But the figures above given show, so far as the 247 who have died are concerned, what has been the main cause that has led to their death, and they also enable us to compare the respective fatalities at different ages in those who have been vaccinated in infancy only and those who have not been vaccinated at all.

RE-VACCINATION.

After referring to a few cases of adults who from their position or occupation were especially liable to the infection of small-pox and who, not having been re-vaccinated, as they ought to have been, caught the disease, the Report proceeds to draw attention to the

experience of the Managers of the Metropolitan Asylums, at their small-pox hospitals and in the ambulances, for many years past. In both of these services re-vaccination was, as a rule, enforced on engagement.

AS TO THE HOSPITAL STAFF.

They proceed to say that of 2198 persons employed at the small-pox hospitals, between 1884 and 1900 inclusive, in which period 17,900 small-pox cases were received into the hospitals, only 17 members of the staff contracted small-pox, of whom 13 were not re-vaccinated until after they had rejoined the ship, and 4 were workmen who had escaped medical observation.

During the past year a large number of new staff had joined the ships and the Gore Farm Hospital, but not one case of small-pox had occurred among them.

Not one of the hospital staff had ever died from small-pox, and not one had suffered from the disease for the last eight years.

AS TO THE AMBULANCE STAFF.

From the year 1881 to the end of 1901 there had been employed on the ambulance service of the Board 1282 persons. Four of them contracted small-pox, of whom one escaped vaccination when appointed ; he died. One was unsuccessfully re-vaccinated on her joining the service, and the operation was not repeated ; she died. The other two had been re-vaccinated, and recovered.

EXPERIENCE OF THE EPIDEMIC OF 1870-72.

The Committee add that these facts confirm the report of the Special Committee on the small-pox epidemic of 1870-2, which stated :

“The necessity of re-vaccination, when the protective power of the primary vaccination had to a great extent passed away, cannot be too strongly urged. No greater argument to prove the efficacy of this precaution can be adduced than the fact that out of 14,800 cases received into the hospitals, only four well-authenticated cases were treated in which vaccination had been properly performed, and these were light attacks.

“Further conclusive evidence is afforded by the fact that all the nurses and servants of the hospitals, to the number at one time of upwards of 300, who are hourly brought into the most intimate contact with the disease, who constantly breathe its atmosphere, and than whom none can be more exposed to its contagion, have, with but few exceptions, enjoyed complete immunity from its attacks.

“These exceptions were cases of nurses or servants whose re-vaccination, in the pressure of the epidemic, was overlooked, and who speedily took the disease, and one case was that of a nurse, who, having had small-pox previously, was not re-vaccinated, and took the disease a second time.”

FURTHER CONFIRMATION OF THE EXPERIENCE OF
THIS EPIDEMIC.

It must not be supposed that this first instalment of the experience of London in the matter of Smallpox and Vaccination in this epidemic presents any novelty to those who are familiar with that of previous epidemics of the disease in recent times. In proof of this statement it may be well to give the statistics of two of the most important recent epidemics: Gloucester, a town in which infant vaccination had been greatly neglected, and Middlesbrough, in which it had been well maintained.

GLOUCESTER EPIDEMIC, 1895-6.

Total Attacks, 1979.‡ Deaths, 434. Fatality, 22·2.

Age	<i>Vaccinated (in infancy).</i>			<i>Unvaccinated.</i>		
	<i>Attacks</i>	<i>Deaths</i>	<i>Fatality per cent.</i>	<i>Attacks</i>	<i>Deaths</i>	<i>Fatality per cent.</i>
Under 10	26*	1†	3·8 ...	680	279	41·0
10-20	263	5	1·9 ...	48	14	29·1
20-30	373	29	7·7 ...	17	8	47·0
30 and over	549	85	15·4 ...	23	13	56·5
Total ...	1211	120 mean 9·9	... 9·9	768	314 mean 40·9	40·9

MIDDLESBROUGH EPIDEMIC, 1898.

Total Attacks, 1411. Total Deaths, 202. Fatality, 14·2.

Age	<i>Vaccinated (in infancy).</i>			<i>Unvaccinated.</i>		
	<i>Attacks</i>	<i>Deaths</i>	<i>Fatality per cent.</i>	<i>Attacks</i>	<i>Deaths</i>	<i>Fatality per cent.</i>
Under 10	43	0	0 ...	62	29	46·5
10-15	121	2	1·6 ...	21	4	19·0
15-25	437	22	5·0 ...	42	16	38·0
25 and over	612	84	13·5 ...	73	45	61·6
Total ...	1213	108 mean 8·9	... 8·9	198	94 mean 47·4	47·4

* 25 out of this 26 were over 5 years of age.

† This was a case of very doubtful vaccination. Of course, if it be eliminated, the fatality under 10 years becomes *nil*, as it was at Middlesbrough.

‡ This number refers to the City of Gloucester only, within the then Municipal boundary. There were about 80 more cases in the suburbs, since then mostly included in the City. The age groups in the statistics of this epidemic and that of Middlesbrough do not precisely correspond with the more detailed arrangement of the London cases, but they are sufficiently alike to allow of the *fatalities* of the three epidemics being fairly compared.

FACTS TO BE NOTED.—1. General correspondence of the three epidemics in all respects except one, namely, the large proportion of attacks and deaths of unvaccinated children at Gloucester.*

2. In each epidemic (*a*) Great difference in fatality, at all ages, between vaccinated and unvaccinated—most marked in childhood; (*b*) *Fatality* in “vaccinated” insignificant in early life; slight from 10 to 20 years, but increasing then and afterwards with age; *attacks* in childhood also few, but increasing with age; (*c*) No such difference in attacks or fatality amongst unvaccinated, the former very high in childhood in the town in which infant vaccination had been neglected (Gloucester), and both also excessive even where there were few unvaccinated children to be attacked (Middlesbrough); (*d*) The great majority of the attacks of the vaccinated, who had been protected only in infancy, are in adults over 20 years of age.

LESSONS.—1. Good vaccination in infancy protects up to about 10 years of age, with a high degree of probability, against *attack* of Small-pox, and almost with certainty against *death*.

2. Even up to middle life it continues to give some protection against *attack*, and still more so against *death*, though in a more rapidly decreasing degree as age advances.

3. Re-vaccination, at about 10 years of age, is necessary in order to maintain protection against attack from Small-pox, and should certainly be repeated after an interval of 10 years at the outside in the case of imminent danger from the actual neighbourhood of the disease.

4. The protection given by efficient vaccination is comparable for a time with that given by an attack of Small-pox, but is not so lasting.

REPLY TO ANTIVACCINISTS' CRITICISMS.

The Antivaccinists in their criticisms on the foregoing statistics of the London epidemic (*Morning Leader*, 14th January, 1902) allege that they are “cooked,” (1) because the cases which had been received into the hospitals before the date of publication but had not been completed by either death or recovery, had not been included; (2) because there were 63 cases classed as “doubtful”; (3) because the fatality amongst the unvaccinated was so high (50.52 per cent.) whereas, it is alleged, the “average fatality” of small-pox was only 14.3 per cent. during the 18th century, before vaccination was introduced; and, lastly, because 760 out of the total of 1017 were so attacked in spite of their having been vaccinated.

In reply to these objections it may be said that (1) the statistics in question do not claim to be complete, except for the 1017 cases

* It has been sought to explain away the lesson of the large number of unvaccinated children attacked in the Gloucester epidemic by the statement that there were so many more unvaccinated than vaccinated children there, that it might be expected that a much larger number of the former than of the latter would be attacked. But, although this is true of the commencement of the epidemic, it does not apply to the greater part of it. For, out of about 10,000 children who were unvaccinated at the outset of the epidemic, more than 8000 had been vaccinated before it reached its climax. So that, during the greater part of the epidemic, there were more vaccinated than unvaccinated children in Gloucester. If it had been otherwise the slaughter of the children, bad enough as it was, would have been as terrible as it used to be in the times before Jenner.

with which they deal, as having been actually finished, either by death or by recovery. It is clearly stated in the report of the Statistical Committee of the Asylums Board, by whom they are issued, that when the complete statistics for the whole epidemic are published the average general fatality is pretty sure to be less than 24·28 per cent. But, the fatality of all the cases taken together is of comparatively little importance, as has been shown above, because it conceals the great difference between the fatality in the vaccinated and unvaccinated *at different ages*. Upon this important difference antivaccinists are always silent, because it is one which cannot be explained away.

2. The fact that there were 63 "doubtful" cases does not materially affect the value of the other figures. If we assume that they were all unvaccinated the case of these latter would be worse than it is now. But if, on the other hand, we assume that they had all been vaccinated and add them to that group, it would only increase the fatality at "ages under 20" from 1·87 to 5·78, and for "all ages" from 14·21 to 18·10, both of which are far below the fatalities of the same two sections in the "unvaccinated" group.

3. It is incorrect to assert that the average fatality amongst those *who had not previously had small-pox* was only 14·3 during the 18th century. No one can say what it was. All estimates on the subject are merely speculative, for reasons which cannot be given here but are discussed in the Report of the Royal Commissioners on Vaccination. Suffice it to say that there is not the least reason to think that small-pox is more fatal now than it was then, or to believe that the power of medicine to cope with it has in any degree diminished. There is good reason to believe that the average fatality of epidemics in the 18th century was not less than 25 per cent. of the attacks, which is more than it is now, when it is so largely swollen by the deaths of adults who have been vaccinated only in infancy, who play the same part in modern epidemics which those who had had small-pox in childhood did in those of pre-Jennerian times, *i.e.* they help to diminish the average fatality—of the whole epidemic and to conceal the fatality—of those who are wholly unprotected.

4. The same fact explains the fourth of the anti-vaccinist objections. No one claims that vaccination in infancy protects against small-pox all through life. As its protective influence becomes gradually enfeebled by lapse of time the vaccinated person drifts gradually into a condition in which he becomes more and more like an unvaccinated one. There is, therefore, no difficulty in understanding why vaccinated adults, whose infant vaccination was probably in many cases not of first-class character, should succumb to the infection of small-pox when exposed to it, nor why they should, as is generally the case, be the first to be attacked in most outbreaks. It would, indeed, be very strange if it were not so. This fact is not only no reflection on vaccination, it is actually a confirmation of what has been above stated: that the difference between the vaccinated and the unvaccinated is largely a matter of *age*.