

Mothers' intentions and the immunization of their infants

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SUMMARY. One hundred and seventy-eight mothers who had recently been delivered were interviewed before discharge from hospital to ascertain their initial intentions about vaccination of their children. Nine months later the behaviour of 154 mothers was checked from health service records; 24 were lost to follow-up.

One hundred and forty-one (92 per cent) of the infants had received at least one dose of vaccine against polio, diphtheria and tetanus. Eighty-five infants (63 per cent of 135) had received at least one dose of vaccine against whooping-cough; 19 mothers had been advised against the vaccine. Failure to have their children vaccinated against whooping-cough correlated with the mothers' initial intentions, although a high proportion of mothers who were initially against the vaccine had started vaccination by the time their child was nine months old. Mothers attending general practitioners were more likely to have their infants vaccinated against whooping-cough than those attending community health clinics, and this difference was not explained by the social characteristics of the mothers nor by more positive early intentions among the mothers who attended general practitioners.

Introduction

IN 1974 Kulenkampff and her colleagues suggested that vaccination against whooping-cough might be responsible for neurological damage in infancy. The proportion of children in Great Britain receiving vaccine against whooping-cough fell from 64 per cent in 1971 to 32 per cent by 1975 (DHSS, 1976), and this fall coincided closely with national and local publicity link-

ing 'brain damage' with vaccination against whooping-cough (McKinnon, 1979). This is the report of an investigation into the low rate in the uptake of whooping-cough vaccine in the St Thomas's Health District, an inner city district in a region with a comparatively low uptake of vaccine (Brimblecombe, 1978).

Method

The study group was comprised of 178 mothers who were resident in the St Thomas's Health District and who were delivered in St Thomas's Hospital in February 1979.

Before discharge from hospital, each mother was asked about her intentions concerning the vaccination of her child against polio, diphtheria and tetanus together, and then her intentions concerning the vaccination of her child against whooping-cough. The answers were recorded on a five point Likert scale, from 'Determined not to. . .' to 'Determined to. . .' have the baby vaccinated.

Nine months later the authorities responsible for the immunization of the infants were sent a short questionnaire asking how many doses of vaccine each child had received, and whether vaccination had been delayed or discouraged for medical reasons. According to the recommended schedule set down by the Department of Health and Social Security at the time of this inquiry, the children should each have received two doses of vaccine. The vaccination status of children at nine months is reported here as 'vaccinated' if the child had received at least one dose of vaccine or 'not vaccinated' if the child had received no vaccine. Our measurement of uptake appears high as we have not followed the usual practice of reporting 'completed' vaccinations.

A number of social factors, including mother's age, schooling, parity, place of birth and social class, were recorded at the time of the initial interview and these are also reported here. Mothers went either to their general practitioner or to a community health clinic to have their babies vaccinated. This depended on whether the general practitioner held regular baby clinics. If he did, the community health services assumed that he would be responsible for vaccinating the baby, otherwise they assumed that they were responsible. The list of practices which held baby clinics was known to the community health services and was used to classify the mothers as going to their general practitioner or to the community health clinic.

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Results

We ascertained the immunization status of 154 of the 178 infants in the study. The large number lost to

Table 1. Number of infants receiving different doses of four types of vaccine.

Number of diphtheria, tetanus and polio vaccine doses received	Number of whooping-cough vaccine doses received				Total
	0	1	2	3	
0	13	0	0	0	13
1	9	13	0	0	22
2	39	1	68	0	108
3	1	0	0	10	11
Total	62	14	68	10	154

Table 2. Uptake of diphtheria, tetanus and polio vaccines by the initial intentions of the mother.

Behavioural intention (score)	Number of mothers	Number of children vaccinated	Percentage vaccinated
- 2 'Determined not to ...'	0	0	-
- 1 'Intend not to ...'	0	0	-
0 'Have not decided ...'	21	20	95
+ 1 'Intend to ...'	90	81	90
+ 2 'Determined to ...'	40	37	92
Intention unknown	3	3	100
Total	154	141	92

follow-up reflects the highly mobile nature of mothers with young babies in Lambeth. The 24 mothers lost to follow-up did not differ from the other 154 mothers in their social characteristics or their intentions concerning vaccination. Table 1 shows the number of doses of each type of vaccine received by the infants. Three groups are demonstrated: those who received both types of vaccine, those who received the three non-controversial vaccines but not the pertussis vaccine, and those who received no vaccine. This third group included both those receiving no vaccine for whatever reason, and late starters in both the other two groups. All the children vaccinated against whooping-cough also received vaccine against the other three diseases.

Table 2 shows that all the mothers had a positive or at least neutral attitude towards the polio, diphtheria and tetanus vaccines and that there was a high uptake of all three.

Table 3 compares the characteristics of the 13 mothers whose children received no vaccine with those of the 141 mothers who had their babies vaccinated. Those who did not have their children vaccinated appeared to be slightly older, with more pregnancies, of lower social class and more likely to have been born in London, but these differences were comparatively small and did not reach conventional levels of significance. On the other hand almost half of those who did not have their children vaccinated attended the same clinic, which served only 11 per cent of the total sample. The uptake of polio vaccine in this clinic (clinic 2) was only 66 per cent, compared with an overall uptake of 91 per cent in the district as a whole. This difference was statistically significant ($\chi^2 = 16.3$; $P < 0.01$).

If the 13 babies who received no vaccine are included, clinic 2 has a lower uptake of whooping-cough vaccine than the rest of the district; but if the 13 babies who had no vaccine are excluded, the clinic used could not be

Table 3. Uptake of vaccines according to social characteristics. (Percentages are shown in parentheses.)

Vaccine uptake	Social characteristics									
	Maternal age median (years)	Parity median (n)	Age left school median (years)	Infants were male	Born in London	Caucasian	Non-manual social class	Married	Living alone	Attending clinic 2
No vaccine (n = 13)	28	2.3	16	6 (46)	7 (54)	8 (61)	3 (23)	7 (54)	1 (8)	6 (46)
Diphtheria, polio and tetanus (n = 49)	24	1.7	16	26 (53)	24 (49)	38 (78)	16 (33)	36 (73)	6 (12)	6 (12)
Diphtheria, polio, tetanus and whooping-cough (n = 92)	24	1.7	16	49 (53)	33 (36)	55 (60)	42 (46)	60 (65)	10 (11)	6 (7)
All vaccines (n = 141)	24	1.7	16	75 (53)	57 (40)	93 (66)	58 (41)	96 (68)	16 (11)	12 (8)

Table 4. Uptake of whooping-cough vaccine by the initial intentions of the mother (excludes 19 mothers advised against vaccine on medical grounds).

Behavioural intention (score)	Number of mothers	Number of children vaccinated	Percentage vaccinated
- 2 'Determined not to ...'	11	4	36
- 1 'Intend not to ...'	11	5	45
0 'Have not decided ...'	38	20	53
+ 1 'Intend to ...'	51	39	76
+ 2 'Determined to ...'	14	13	93
Intention unknown	10	4	40
Total	135	85	63

χ^2 for trend = 14.9 ($P < 0.001$).

shown to have a significant effect on the uptake of whooping-cough vaccine. This suggests that the failure to vaccinate in clinic 2 is not specifically linked to the whooping-cough vaccine.

Nineteen out of 154 mothers for whom information was available were advised against the whooping-cough vaccine on medical grounds; three of their children had at least one dose of vaccine, but all 19 were excluded from further analysis. In order not to put too great a burden on the clinics we did not ask for the reasons why parents were advised against vaccine. The 19 mothers who were advised against vaccination did not differ from the rest in initial intentions. For 37 of the remaining 135 children vaccination was delayed on medical grounds, for 93 there was no such delay, and for five we have no information as to whether there was a delay or not. Of those for whom there had been a delay on medical grounds, 22 infants (59 per cent) had started vaccination by nine months of age compared with 64 infants (69 per cent) for whom there was no such delay. This difference was not significant at conventional levels ($\chi^2 = 1.0$; $P > 0.25$).

Table 4 shows that there was a correlation between the mothers' initial intentions and the probability that they would have their babies vaccinated against whooping-cough. If the 13 infants who had no vaccine at all are excluded from this table the correlation between the mothers' early intention and subsequent behaviour persists.

No social or demographic variable is a significant explanation of the differences in the uptake of whooping-cough vaccine (Table 5).

Table 6 shows the marked difference in uptake of whooping-cough vaccine between those who attended a clinic and those who attended their general practitioner. These differences are also seen in the health visitors' records of completed vaccination courses at 15-22 months of age (Dr Stuart Spring, personal communi-

Table 5. Social characteristics, intentions and uptake of whooping-cough vaccine of 125 mothers for whom both intentions and behaviour were known.

Social characteristic	Intention (mean score)	Number of mothers in sample	Percentage of children vaccinated
<i>Social class</i>			
Non-manual	0.32	44	75
Manual	0.46	68	62
Other/unknown	0.08	13	46
<i>Race</i>			
Caucasian	0.27	82	60
Other	0.57	42	74
Unknown	—	1	—
<i>Marital status</i>			
Single	0.63	35	74
Married	0.27	81	64
Other/unknown	0.22	9	33

Table 6. Uptake of whooping-cough vaccine by service used.

Service used	Number of mothers	Number of children vaccinated	Percentage vaccinated
Clinic	72	39	54
General practitioner	42	35	83
Moved	11	7	64
Total	125	81	65

χ^2 for trend = 9.9 ($P < 0.001$).

(The 19 mothers advised against this vaccine on medical grounds have been excluded from the analysis. The behavioural intention of a further 10 mothers was not recorded.)

cation). Those children who were taken to the general practitioner were significantly more likely to be vaccinated against whooping-cough than those taken to a clinic ($\chi^2 = 9.9$ $P < 0.005$). Table 7 shows that this was not merely a reflection of differences in the initial intentions of the mothers. If anything, the initial intentions of the general practice patients showed them to be less inclined towards accepting the whooping-cough vaccine. When we estimated the relative odds of being vaccinated using a multiple logistic model to allow for differences in initial intentions, the mothers who attended their family doctors were seen to be much more likely to have their babies vaccinated against whooping-cough compared with those who attended the clinics. In all cases, children who had moved had a probability of being vaccinated intermediate between those of the children attending general practices and those attending local clinics.

Discussion

The mothers' eventual uptake of whooping-cough vaccine was best predicted from their original inten-

Table 7. Uptake of whooping-cough vaccine by service used and by mothers' initial intentions (Number vaccinated/total).

Behavioural intention	Clinic	General practitioner	Moved	Total (percentage)
- 2	1/7	3/4	0/0	4/11 (36)
- 1	0/3	5/7	0/1	5/11 (45)
0	9/22	7/10	4/6	20/38 (53)
+ 1	21/32	15/15	3/4	39/51 (76)
+ 2	8/8	5/6	0/0	13/14 (93)
Total	39/72	35/42	7/11	81/125
Percentage	54	83	64	65

tions and from whether they went to their general practitioner or to the local clinic. The measured social characteristics of the mothers were comparatively unimportant.

The higher rate of uptake by mothers who attended their general practitioners might be explained by a number of the following hypotheses.

1. *General practitioners provide a more accessible service.* This seems unlikely as the initial uptake of vaccine against polio, diphtheria and tetanus was high except in one clinic, and this was due to the cautious policy of one medical officer.

2. *General practitioners had a more positive attitude towards the whooping-cough vaccine.* We did not obtain the opinions of the general practitioners or the clinic doctors, though such a survey was undertaken in Leeds by Wilkinson and his colleagues (1979). They found that although fewer of the general practitioners thought that immunization against pertussis was 'very important', as compared with the clinic doctors and health visitors, the general practitioners had experienced a smaller decrease in the uptake of vaccine. This makes it unlikely that the smaller decline in vaccination rates among general practitioners was due to their greater enthusiasm for the vaccine.

3. *General practitioners can assess contraindication to vaccination more easily.* As general practitioners have the full medical records of the child and the family, contraindications can be assessed with some certainty. In the clinics the medical officers may have less reliable information and so may be more cautious.

4. *Patients who go to general practitioners differ from patients who attend clinics.* Mothers who went to their general practitioners were less inclined to accept the vaccine at the initial interview. No other significant differences between the two groups were detected, and it is unlikely that the mothers' characteristics could account for the higher uptake by the patients of general practitioners.

5. *General practitioners advice seems more relevant to the patient than that given by the clinic doctors.* Graham (1976) has shown that advice given to mothers

concerning smoking in pregnancy is discounted if it is not seen to refer to them personally. The advice of a doctor who, the mother feels, knows her individually may carry more weight than that of a doctor who, the mother may feel, does not understand her personal situation.

6. *Continuity of care provided by general practitioners may make patients feel under a greater constraint to take advice offered.* As a mother is likely to see her general practitioner in the future, she may feel more constrained to take the advice of her own doctor than to take the advice of a clinic doctor, whom she need never see again.

Conclusion

We have shown that the uptake of primary whooping-cough vaccine in Lambeth at the time when this vaccine was controversial was dependent on the mothers' initial intentions towards vaccination. However, the service that the mothers used was also important and those attending their general practitioners were more likely to have their babies vaccinated regardless of their initial intentions. This has wide implications for the provision of services, particularly in areas with low uptake of vaccine, and further studies are required to investigate the reasons for this observation.

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