

Original articles

Measles immunisation: feasibility of a 90% target uptake

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SUMMARY A three part investigation of the factors that might influence uptake of immunisation was carried out in Maidstone Health Authority; this included studies of the computer system and attitudes of parents and professionals. Several problems with immunisation scheduling, information transfer between general practitioners and clinics and the computer centre, and validity of computer information were identified. The attitudes of parents, relatives, and friends were generally favourable, although parents reported a lack of knowledge about the disease and vaccine and lack of advice from professionals. Perceived contraindications to immunisation, particularly a history of measles, were important reasons for non-uptake. Professionals' perceptions of contraindications, however, were at variance with Department of Health and Social Security guidelines and none of the recorded contraindications was valid. Calculations of potential uptake suggest that a 90% target uptake is feasible and recommendations are made for changes in services.

A safe and effective immunisation providing lasting immunity against measles has existed since 1968 and yet measles remains a common serious illness. Between 1970 and 1983 there were 270 deaths in Britain from measles and 175 deaths from subacute sclerosing panencephalitis, a long term complication of measles.¹ Notifications of the disease during this period, despite considerable undernotification, ranged from 52 000 to 300 000 a year, with an annual average of 100 000.² In Maidstone health district alone about 600 cases are notified each year. Measles also causes some avoidable morbidity; complications from measles were studied in 1976 and showed little change from a study carried out 13 years earlier.³

There is national concern that the high incidence of measles should be reduced by ensuring that all eligible children receive immunisation.²⁻⁴ It is difficult to explain the low uptake as measles immunisation has not attracted the adverse publicity that pertussis immunisation has; it requires only one dose; and many health authorities have child health computing systems for administering and scheduling appointments. Several recent studies have suggested that some of the reasons may include poor administration of immunisation services, a lack of commitment among health authority staff, and a lack of under-

standing of the indications and contraindications of this vaccine.⁵⁻¹²

The South East Thames Regional Health Authority (SETRHA) health promotion group recommended that health districts should attempt to achieve a 90% uptake of measles immunisation in the 15 month age group. To help authorities achieve this it is necessary to understand the factors that might influence uptake. This may identify the ways in which people may either be encouraged to use services offered or to change the type of service to improve the location and provision for services for current non-attenders.

When this study was first proposed in 1982 the recorded uptake for measles immunisation in Maidstone was 71%. These figures happened to be the best figures in Kent but were still short of the target. Maidstone District Health Authority uses the standard child health computer system for scheduling immunisation. A three stage investigation of possible factors contributing to the low uptake of measles immunisation was carried out. The stages are (a) a study of the SETRHA version of the standard child health computer system (its functioning and the transmission of information between the various service providers and the computer centre) to establish whether the low uptake of measles immunisation

could be partly due to a malfunction in the total information network; (b) a study of the attitudes and beliefs of parents about measles immunisation and parental socioeconomic factors that are associated with the uptake of the service in Maidstone; and (c) a study of the knowledge, attitudes, and beliefs of health professionals about measles immunisation and their potential influence on the uptake of the service.

Subjects and methods

STUDY OF INFORMATION SYSTEM

In December 1984 the SETRHA computer produced a list from the registered birth cohort of 1981 of all children currently resident in the Maidstone Health Authority. This list, comprising 2356 children, was divided into two groups: those recorded by the computer as having taken up the vaccine (n=1736) and those recorded as not having taken up the vaccine (n=620). Separate random samples were taken with a larger sampling fraction for unimmunised children (as the reasons for non-immunisation were of most interest to us); the immunised children served as a control group. This resulted in 182 immunised and 350 unimmunised children, respectively. Having identified this group of 532 children, the computer system, child health clinic, and

general practitioner records were searched for potential reasons for non-uptake. Collection of data took place between December 1984 and June 1985 when all children were at least 3 years old, and consisted of searching these three separate sources for identical items of information that were related to reasons that could explain non-uptake of measles immunisation (table 1). In addition, a search for discrepancies between the three record sources was carried out to identify possible problems in information transfer. For each of the reasons identified (based on the frequency of the reason) the level that the uptake rate could potentially be raised, if the reason was adequately tackled, was calculated.

STUDY OF PARENTAL ATTITUDES

The SETRHA computer centre produced a list of infants resident in the Maidstone district who would be 13 months old between September and December 1984. A random study sample was drawn from a list of 539 such infants; the remainder formed a control group. A research assistant interviewed the parents in the study group during the week when the child was 13 months old. Of the 199 patients selected for interview, 174 were actually interviewed (a response rate of 87%). The rest had either moved, were not available for interview at three attempts, or in a few cases refused to be interviewed. To avoid

Table 1 *Potential reasons for non-uptake of immunisation*

<i>Reason</i>	<i>Numbers of unimmunised children (no (%)) (n=347)</i>	<i>Potential for change in observed rate of 73.7%</i>	<i>Numbers of immunised children (no (%)) (n=182)</i>
Related to information system			
Change of address during child's first three years (according to clinic or general practitioner)	48 (14)	+4.0	23 (13)
No general consent form for immunisation returned to computer centre	30 (9)	+2.3	3 (2)*
Received immunisation (according to general practitioner or clinic) but not notified to computer	51 (15)	+4.3	—
Did not complete course of triple vaccines (according to computer or clinic)†	84 (24)	+6.4	15 (8)**
Not directly related to information system			
Consent for measles immunisation withdrawn (according to computer)	130 (37)	+9.9	10 (5)**
Consent for all immunisation withdrawn (according to computer)	19 (5)	+1.4	5 (3)
Contraindications recorded (clinic or general practitioner)‡	99 (29)	+7.4	10 (5)**
Already had measles disease (according to computer, clinic, or general practitioner)	122 (35)	+9.2	9 (5)**
Any of these (the above are not mutually exclusive)	305 (88)	+23.1	57 (31)
Other reasons	33 (10)	—	3 (2)

*p<0.005; **p<0.001.

†Diphtheria/Tetanus/Polio; this would have prevented scheduling for appointments for measles immunisation.

‡Clinic records listed 106 contraindications for 98 children.

influencing measles immunisation uptake in the study group, questions relating to measles formed just a part of the interview, which was designed and introduced as a survey of parental views of community health services. The possible influence of the interview on uptake was checked by monitoring immunisation in the control group. Measles immunisation was scheduled in the normal way when the infants were 14 months old. Immunisation uptake was monitored through the child health computer system until the infants were 20 months old. Of the 174 parents interviewed, the children of 43 were recorded as not having taken up immunisation. Attempts were made to follow up these 43 and 40 were interviewed or their whereabouts ascertained. Actual and potential immunisation uptake rates were calculated based on uptake as recorded by the computer records and follow up interviews. Finally, actual uptake rates among socioeconomic subgroups were compared using χ^2 tests.

STUDY OF PROFESSIONALS' ATTITUDES

A questionnaire was sent to all general practitioners, clinical medical officers, health visitors, and paediatricians in two health authorities: one that had carried out a previous campaign about measles immunisation among health professionals (Maidstone) and one that had not (Canterbury and Thanet). The questionnaire was based on those used previously in similar studies on whooping cough and measles and was modified slightly to suit our requirements.¹³ After the question, 'Would you recommend measles immunisation at 15 months in the following circumstances' were 23 statements of typical problems encountered in everyday medical practice concerning measles vaccination. The professionals had the option of responding 'yes', 'yes qualified' (that is with precautions), 'no' or 'not known'. Only in one case was measles immunisation clearly contraindicated, and professionals were expected to make a positive recommendation in most cases. In addition, there were some direct questions on measles immunisation and the disease.

Results

The main findings of the three studies are presented here; detailed results of each study have been reported separately.¹⁴⁻¹⁶

INFORMATION SYSTEM

Table 1 summarises the main reasons for non-uptake identified for 347 unimmunised children in the information system study (basic information was missing for three of these children). Results based on the 182 immunised children are also shown.

Measles was recorded by at least one source of information in 122 (35%) unimmunised children: in 28 it was recorded as having occurred before 15 months when immunisation should have taken place. None of the 64 cases of measles known to the computer system was notified until the child was at least 14 months old. Of the contraindications listed, clinic records listed 106 for 98 children, this included those with previous measles disease (50 cases); allergies that were often to eggs (18 cases); a family history of convulsions (18 cases); and a history of convulsions in the child (nine cases). None of the recorded contraindications was found to be valid when assessed against DHSS guidelines.

PARENTAL ATTITUDES

The results presented here refer to the 174 parents who were interviewed and about whom information was available. The parents' overall attitude to measles immunisation and the attitudes of their relatives and friends were regarded as favourable or neutral in over 90% of interviews; 113 (65%) of parents, however, said that they lacked knowledge about the vaccine and 43 (25%) expressed uncertainties about possible side effects. A small percentage (about 10%) mentioned supposed contraindications in terms of the family or child's medical history (especially fits and egg allergies). By the time their children had reached 13 months, mothers had received little advice about measles immunisation from professionals: 160 (92%) reported receiving no advice from the child health clinic, 153 (88%) no advice from their general practitioner, and 144 (83%) no advice from the health visitor. Professional advice was reported as sometimes discouraging immunisation if the child had experienced measles already, contrary to DHSS guidelines.¹⁷

Of the 174 parents interviewed, 43 (25%) were recorded by the computer as not having taken up measles immunisation for their child and 40 of the latter were interviewed or their whereabouts ascertained. A small number (nine) said their child had received the immunisation but always after 17 months. Another group (11) had moved out of the area, although the date of the move was unknown. Of the remaining 20 eligible children, seven parents said that they had decided not to take up the immunisation. This was mainly attributed to the child having experienced measles already (three cases) and worries about contraindications as a result of the family or the child's medical history. The other 13 parents said they were 'delaying' immunisation, this was mainly ascribed to their child having another illness—in six cases colds or ear infections—but parents also mentioned previous experience of measles (two cases), worries about

possible contraindications, and in a few cases 'forgetting' or 'being too busy.' Few health service problems were mentioned.

The uptake of immunisation at 20 months, recorded by the computer system, was 74% for the interviewed group (129/174) and excluding the children who had moved 79% (129/163); 56.5% for the non-responders (13/23); and 73% for the control group (241/330). The immunisation status was unknown in 12 cases. Revised rates of immunisation uptake were calculated from information from the follow up interviews plus the computer records and were 80% (140/174) or 86% (140/163) excluding the children who had moved. The potential uptake figure was based on children known to have been immunised, plus the 13 'delayers' and the three children who were not immunised because of having had measles already; this gave a potential uptake rate of 90% (156/174) and excluding the children who had moved 96% (156/163). If children with other recorded contraindications were included the figures were 92% and 98%, respectively. Actual uptake rates were lower among children whose mothers finished full time education at age 16 or less (68% v 83%) or who were from manual social classes (69% v 80%), but uptake was higher among first babies (81% v 70%); these differences, however, were not quite significant at the 5% level.

PROFESSIONALS' ATTITUDES

The response rate from all doctors in the two health authorities was 59% (161/274) and that from health visitors was 76% (70/92); professional status was not recorded in five responses. In general there was considerable variation in responses to the recommendations for immunisation between doctors, health visitors, and the two districts. The response rates for the 10 recommendations that were most

contrary to what would be expected (based on DHSS guidelines) are summarised in rank order (based on the range of rates) in table 2.

Discussion

Previous studies of reasons for non-uptake of measles immunisation have been limited by small samples, very local populations, or examination of individual aspects of measles immunisation. In this paper we summarised the findings of a comprehensive range of studies and investigated several aspects of measles immunisation in the same geographical area with random samples of whole district populations. We were particularly impressed by the finding that three very different studies, investigating different aspects of immunisation uptake, identified a similar range of problems—for example, all three studies indicated that perceived contraindications to immunisation were an important reason for non-uptake. Further investigation has shown, however, that the contraindications quoted were not valid in most cases. All three studies have indicated that a history of measles was perceived as an important contraindication, although in many cases the disease was a consequence of non-uptake of immunisation and occurred after 15 months of age. Apart from these common problems the individual studies have identified specific problems and several recommendations are made for changes in services based on these findings.

The study on information systems identified several problems in information transfer that could be investigated locally. Potential deficiencies in information transfer that applied to unimmunised children might also apply to immunised children. Hence a comparison of the two groups was carried out. Potential deficiencies identified among the

Table 2 *Proportion of doctors and health visitors who made recommendations for immunisation contrary to those expected based on DHSS guidelines*

<i>Case history at age 15 months</i>	<i>Response expected (DHSS)</i>	<i>Response actually made</i>	<i>Doctors (no (%)) (n=161)</i>	<i>Health visitors (no (%)) (n=70)</i>
Non-anaphylactoid allergy to egg or milk	Yes	No	79 (49)	19 (27)
Professional thinks baby has had measles	Yes	No	86 (53)	6 (8)
Febrile convulsion at age 11 months	Yes/Qualified	No	48 (30)	24 (34)
Afebrile but snuffly	Yes	No	51 (32)	20 (29)
Spina bifida and hydrocephalus	Yes	No	40 (25)	17 (24)
Parent says baby has had measles	Yes	No	46 (29)	4 (6)
Leukaemia	No	Yes/Qualified	28 (17)	10 (14)
Irritable/cyanosis when newborn	Yes/Qualified	No	21 (13)	14 (20)
Meningitis without fits	Yes	No	23 (14)	12 (17)
Brother has febrile convulsions	Yes	No	18 (11)	15 (21)

unimmunised, however, could still be the true cause of non-uptake. Even if all these barriers to immunisation were appropriately tackled the potential improvement in uptake rate quoted is unlikely to be achieved completely. Several areas for improvement, however, have been identified: families' address changes should be notified by clinics and general practitioners more promptly and more complete notification of immunisation is required from them. Feedback of uptake rates to general practitioners and health visitors and of lists of apparent 'defaulters' could also help. Children who have not completed the course of triple vaccines should not be suspended from the list for scheduling appointments for measles immunisation; this has in fact been implemented in the national child health computer system. Data on moves in and out of a district and when they occur are necessary to estimate uptake. 'Movers out' should not be deleted from the computer file, as is the current practice, but data on the date of their move should be collected and they should contribute to the numerator and denominator of the uptake rate until the time of their move.¹⁸ Finally, those parents who positively withdrew their consent for measles immunisation at the time when it was due (37% of our unimmunised group) could be counselled more positively by health professionals.

In the study on parental attitudes there was no difference in uptake rates between the study and control group (that is, the interview had no effect on the uptake), but there was a difference between responders and non-responders. These uptake rates should be borne in mind when interpreting the results. The non-responding group might have had less favourable attitudes towards measles immunisation and this might also lower the actual and estimated potential uptake rates of measles immunisation. It is clear from the responses that parents differentiated between measles and other immunisations. Concern about the side effects of measles immunisation mainly took the form of raising questions about possible side effects rather than actual knowledge or real worries about side effects. It should be noted that the measles questions were asked at 13 months—that is, before the measles immunisation but after the other immunisations were due. Not all babies, however, were first born and some parents should have already been exposed to information on measles. Parents require more advice about measles disease and immunisation from health professionals and more advice about the recognised contraindications for measles immunisation.

We found that the social class distribution of our sample was almost identical with that for married

men aged 20–44 in Great Britain in 1980, according to the Registrar General's 1980 social class classification.¹⁹ Differences in uptake rates between socioeconomic groups, although not significant, followed the usual pattern with lower uptake among the manual classes. Such differences may be even greater in areas with a higher proportion of the population in the most disadvantaged groups.

In the study on professionals' attitudes the difference in knowledge and attitudes between doctors and health visitors may actually be greater than observed: the non-responding doctors may have less favourable attitudes than those responding. A small core of professionals have negative attitudes and behaviour towards measles immunisation¹⁶ and there is a larger group whose interpretation of contraindications is at variance with DHSS guidelines.¹⁷ The question with the most variable response was the one on egg allergies. Vaccination is only contraindicated where there is a history of an anaphylactoid reaction, yet 49% (79/161) of the doctors said they would not recommend immunisation with a history of a non-anaphylactoid reaction to eggs. For some conditions—for example, spina bifida and hydrocephalus—measles immunisation is actually indicated because of the adverse effects of measles if contracted by the compromised host. Yet 25–45% of professionals responded 'no' or 'not known' for such cases. Children with a history of convulsions should still be given measles vaccine with appropriate precautions. Yet for the baby that had a febrile convulsion at the age of 11 months, 25–42% of professionals said they would not recommend immunisation. Serological studies in children with a history of measles in early life have shown that a diagnosis in children under the age of 24 months was incorrect in a large proportion of cases; thus immunisation was not contraindicated.²⁰ A large proportion of doctors in both districts, however, saw a history of measles as a contraindication, particularly if they had made the diagnosis themselves. It should be made quite clear to health professionals that this is not a contraindication.

Health professionals need clearer guidelines on contraindications with periodic reminders. In Maidstone a summary report containing the findings of the study on professionals' attitudes has been distributed to and discussed with health professionals and the department of community medicine has carried out personal communication with individual general practitioners. The department of community medicine at St Thomas's has developed an interactive, computer aided educational program on a BBC microcomputer. The program replicates the professionals' questionnaire, allocates a score based on responses to questions, quotes some of the

results of this study, and gives information on DHSS and other guidelines in the feedback to the user. This program may be extended to cover other immunisations. Health visitors can play an important part in monitoring uptake and ensuring that those who 'delay' because of illness eventually take up the vaccine. A questionnaire similar to the follow up interview in the survey on parental attitudes might be used for the purpose of monitoring and audit.

The various calculations of potential uptake of immunisation indicate that a target uptake of 90% is feasible in Maidstone and practical recommendations for service change have been identified. In Maidstone, some of these changes have already been implemented and will be supplemented by more aggressive monitoring of non-uptake using the follow up questionnaire. The problems identified in Maidstone probably apply to other districts, and implementation of some of the key recommendations could help achieve the national target of 90% uptake by 1990.

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