Why do parents hesitate to vaccinate their children against measles, mumps and rubella?

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Background: Thanks to a successful voluntary vaccination programme, measles, mumps and rubella are rare diseases in Sweden. Coverage among children 18 mo of age has been 99%, but the measles, mumps and rubella vaccination (MMR) has increasingly been questioned among parents.

Aim: To study reasons why parents choose not to vaccinate their child against measles, mumps and rubella, and their opinions on vaccines and the diseases themselves. A secondary objective was to compare coverage at 18 mo of age based on parental report with the national statistics based on patient charts.

Methods: The official statistics were compared with patient charts for two birth cohorts in the city of Göteborg, Sweden. Out of these children born in 1995 and 1996, 300 unvaccinated and vaccinated children were identified. Their parents received a postal questionnaire assessing the parent’s views on vaccines and childhood diseases. Results: The documented vaccine coverage in this study was higher in 1995 and 1996 than official statistics indicated. The major reason, for both groups, for accepting respectively declining vaccination was strengthening the child’s immune system. Parents with children unvaccinated against MMR were also more likely to have declined vaccination against diphtheria, polio, tetanus, Haemophilus influenzae and pertussis. One-third of the parents with a child unvaccinated against MMR had not yet made their final decision 3 y after the vaccine offer. Few parents, both with vaccinated and unvaccinated children, had acquired vaccine information from the Internet. Both groups believed that insufficient time was allocated for vaccine information and discussion at the Child Health Centre.

Conclusion: Our study indicates that official statistics on MMR vaccination uptake underestimate the number of vaccinated children. Vaccine safety is a major concern for many parents and needs to be addressed by healthcare professionals at institutions offering paediatric vaccinations.

Key words: Immunization, parents, MMR, children, vaccine safety

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There is currently no endemic measles, mumps and rubella in Sweden, and has not been for over a decade. This is the result of a successful voluntary vaccination programme that was initiated in 1982 by the National Board of Health and Welfare. The introduction was followed by a rapid decline in disease incidence rates.

The vaccines used are combined measles, mumps and rubella vaccines with attenuated live viral strains. The Child Health Centres (CHC) responsible for surveillance and prevention of childhood diseases for children up to 7 y (1) offer the vaccine free of charge at 18 mo of age. A booster dose is offered free of charge by the school health system at 12 y of age.

The MMR vaccine is more often rejected than the other vaccines offered at CHCs; namely, polio, diphtheria, tetanus, Haemophilus influenzae and pertussis. The reason for this is that studies suggesting an association with autism, atopy and inflammatory bowel disease (2, 3) have received much attention in the Swedish media. These associations have not been verified by other groups (4-6), but those studies have not received similar attention.

Another reason for why the MMR vaccine is more often rejected compared to other vaccines is that an increasing number of parents are concerned that infants receive too many vaccines (7), and the MMR vaccine is the last vaccine offer.

Coverage against MMR has decreased slightly in Sweden during recent years. According to national statistics (8), children born in 1994 had coverage of 97% compared to children born in 1997 with coverage of 95% at the age of 18 mo. While the national average is still well above the level required for herd immunity, there are now an increasing number of municipalities...
with coverage below that level. Other European countries, e.g. the United Kingdom, have experienced a similar decrease. Thomas et al. (9) described a decline in MMR vaccination uptake of about 3.5% after 6 mo of negative publicity in Wales.

Except for media attention, vaccine coverage may depend on factors such as race, parental education and attitudes, socio-economic status and availability of health care (10, 11).

Knowledge of factors influencing coverage of vaccination in western societies where vaccines are easily accessible and free of charge is limited. Gellin et al. (12) have recently performed a telephone survey in the US and found that parents are concerned that vaccines weaken a child’s immune system and that they are not proven safe before being used. However, this study involved parents or legal guardians of any child under age 6 y and did not focus on parents who have actually made a decision to decline vaccination.

Our aim was to examine the reasons why a small minority of Swedish parents chooses not to vaccinate their child against measles, mumps and rubella. A secondary aim was to compare the coverage at 18 mo of age based on parental report with that of the national statistics based on patient records.

Methods

Study group

CHC nurses reviewed the charts of all children born in 1995 (n = 4948) and 1996 (n = 4778) who were registered at the 27 CHCs in the city of Göteborg in November 1999.

All children who had not received MMR were identified (n = 190). Vaccinated children listed prior to the unvaccinated children in the birth register at the CHC were chosen as controls for each unvaccinated child in the 1996 cohort.

Controls in the 1995 cohort were not chosen, since we did not expect any differences between the age groups of vaccinated children. This was due to time constraints and our efforts to secure sufficient numbers of unvaccinated subjects, as we expected a low response rate.

Data collection

Official statistics regarding MMR vaccine coverage are based on yearly reports from personnel at the CHCs after reviewing the patient records. MMR vaccine status is only reported once for each child, and vaccination performed after reporting is not included in the official statistics.

Personnel at the CHCs supplied the demographic data and the names and addresses of the selected families for this study. Questionnaires were sent to the parents of unvaccinated children that had been offered a MMR vaccination according to the case report. Parents of children who had not, for some reason, been offered a vaccination (n = 24) did not receive a questionnaire. The majority of these parents were newly arrived immigrants and had not yet been offered vaccination. All parents (n = 166, 87%) who had actively declined the offer of MMR vaccination received a questionnaire.

Nurses at two CHCs did not supply the names and addresses of families with unvaccinated children in fear of aggravation. These nurses did, however, distribute the questionnaire themselves directly to the parents. These families did not receive a reminder due to this procedure.

Out of the 111 parents with vaccinated children, 96 (87%) received the questionnaire. Four nurses failed to provide names and addresses for 15 vaccinated children due to misunderstanding of study instructions.

Two hundred and seventy-seven families were selected. A total of 262 questionnaires were sent, and a reminder was posted 10 d later. Twelve questionnaires never reached the intended addressees and were returned. Thus, the questionnaire reached 250 parents; 158 with unvaccinated and 92 with vaccinated children.

Questionnaire

The questionnaire focused on five main subjects: the child’s current vaccination status, reasons behind the decision to vaccinate or not, prior knowledge of or experience with MMR vaccination, parental experiences of the vaccination procedure, and opinions regarding the diseases measles, mumps and rubella and the MMR vaccine. The latter was studied by presenting 18 statements listed as myths by Hall and O’Brien in “Immunisation—myths and realities” (13). Parents were asked to respond to the statements with the following: agree, partially agree, hesitant or disagree.

Statistical methods

A possible difference in responses to the statements between the groups of parents with vaccinated and unvaccinated children was analysed by means of the χ² test with Yates’s correction for continuity. A p-value less than 0.05 was regarded as significant. The 95% confidence interval (CI) for the difference in proportions was calculated (14). The study protocol was approved by the Ethics Committee of Göteborg University.

Results

Chart review

The chart review in Göteborg revealed that 2% (n = 79) of the children born in 1995 and 2% (n = 111) of those born in 1996 had not received the MMR vaccination at the end of their fourth or fifth year at the time of the study. Thus, the vaccine coverage in this study was 98% for both the children cohorts.
Parental reasons to vaccinate with MMR

- Vaccines are harmful
- To strengthen the child’s immune system
- Measles, mumps and rubella are beneficial for the child’s development
- Parents have undergone the diseases without harm
- Vaccination is unnecessary, other methods are better
- Measles, mumps and rubella are harmless
- The child has a chronic disease
- Vaccine does not protect the child from child diseases
- Vaccination is painful for the child
- To protect the child when travelling abroad
- To prevent the complications of measles, mumps and rubella
- Parents have been vaccinated without complications

Number of parents

0 10 20 30 40 50 60

Fig. 1. Reasons why parents (a) choose to vaccinate or (b) did not vaccinate their child against measles, mumps and rubella. Parents were asked to state the three most important reasons why from 1 to 3 with 1 as the most important reason.

The official statistics for these cohorts states that 3% (n = 167) and 4% (n = 195) of the children, respectively, did not receive MMR vaccination. The vaccine coverage compiled in this study differed significantly from the official statistics (98% vs 97% in 1995 and 98% vs 96% in 1996; p < 0.05).

Response rates
The response rate was 42%, as 277 families were selected and 118 were returned. The response rate in areas with many unvaccinated children where the nurses sent the questionnaire was 28% (11/39). Parents with vaccinated children (70%, n = 68/96) were more likely to answer than parents with unvaccinated children (32%, n = 50/154) (95% CI for the difference, 38%, was 26–40%).

MMR status
Ten children were found to be vaccinated but were registered at the CHC as unvaccinated. All children registered as vaccinated were in fact so. Five parents did not answer the question on the child’s MMR status and, in those cases, we assumed that the CHC record was correct.

There were 50 respondents who had not vaccinated their child, and two-thirds of those did not intend to vaccinate their child in the future. The remaining third had not yet made their final decision on this. Sixty-eight respondents had vaccinated their child or intended to do so. In 10 cases, vaccination was delayed and took place after the 18-mo health visit. The reason for postponing the MMR vaccination was severe allergies or persistent infections.

General vaccination status in relation to MMR status
Children with no MMR vaccination were more likely to be unvaccinated against diphtheria, tetanus, polio, pertussis and Haemophilus influenzae (28%, n = 14) than MMR-vaccinated children (6%, n = 4) (95% CI for
Table 1. The distribution of parental agreement/disagreement with a series of statements regarding vaccines and childhood diseases. The median profiles of level of agreement are in bold face.

<table>
<thead>
<tr>
<th>Statement (n)</th>
<th>Agree</th>
<th>Partially agree</th>
<th>Hesitantly agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>In favour of vaccination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modern vaccines are safe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (48)</td>
<td>4%</td>
<td>25%</td>
<td>50%</td>
<td>21%</td>
</tr>
<tr>
<td>Vaccinated (63)</td>
<td>30%</td>
<td>52%</td>
<td>17%</td>
<td>0%</td>
</tr>
<tr>
<td>Suffering the disease itself is more harmful to the child than the vaccination is</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (48)</td>
<td>23%</td>
<td>35%</td>
<td>25%</td>
<td>17%</td>
</tr>
<tr>
<td>Vaccinated (64)</td>
<td>72%</td>
<td>22%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Vaccination protects well against diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (48)</td>
<td>36%</td>
<td>34%</td>
<td>26%</td>
<td>4%</td>
</tr>
<tr>
<td>Vaccinated (65)</td>
<td>66%</td>
<td>31%</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>There are serious complications to measles, mumps and rubella</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (49)</td>
<td>18%</td>
<td>57%</td>
<td>22%</td>
<td>2%</td>
</tr>
<tr>
<td>Vaccinated (64)</td>
<td>45%</td>
<td>42%</td>
<td>11%</td>
<td>2%</td>
</tr>
<tr>
<td>Not in favour of vaccination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is preferable to have had the childhood diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (48)</td>
<td>52%</td>
<td>35%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Vaccinated (63)</td>
<td>14%</td>
<td>29%</td>
<td>17%</td>
<td>40%</td>
</tr>
<tr>
<td>Vaccine can cause chronic diseases in children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (48)</td>
<td>38%</td>
<td>40%</td>
<td>13%</td>
<td>10%</td>
</tr>
<tr>
<td>Vaccinated (62)</td>
<td>2%</td>
<td>13%</td>
<td>47%</td>
<td>39%</td>
</tr>
<tr>
<td>Vaccine impairs the body's natural resistance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (49)</td>
<td>51%</td>
<td>37%</td>
<td>12%</td>
<td>2%</td>
</tr>
<tr>
<td>Vaccinated (60)</td>
<td>5%</td>
<td>37%</td>
<td>18%</td>
<td>40%</td>
</tr>
<tr>
<td>Vaccines contain foreign compounds that can cause allergies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unvaccinated (48)</td>
<td>56%</td>
<td>31%</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>Vaccinated (62)</td>
<td>6%</td>
<td>31%</td>
<td>52%</td>
<td>11%</td>
</tr>
</tbody>
</table>

the difference between groups, 22%, was 8-36%; $p = 0.003$).

Factors influencing the decision to vaccinate or not

Parents were asked to choose from a list of proposed reasons the three most important reasons influencing their decision to vaccinate or not. The main reasons for the parents of unvaccinated children were that vaccines are harmful and that the diseases are harmless or even beneficial (Fig. 1). Parents who did vaccinate wanted to protect their child against the diseases and complications. Both groups of parents believed that their vaccine decisions would strengthen their child's immune system.

Parents' knowledge and sources of information

A greater proportion of parents with unvaccinated children (84%, $n = 42/50$) than with vaccinated children (67%, $n = 44/66$) (95% CI for the difference, 23%, was 8-38%) reported they had some knowledge about the MMR vaccination before the vaccination visit. Parents with unvaccinated children used more sources of information to expand their knowledge beforehand. Few parents in both groups had tried to acquire vaccine information from the Internet.

Parents' experience from the vaccination procedure

Twenty percent of the parents with unvaccinated children had not decided upon vaccination before the visit at 18 mo of age at the CHC. The corresponding proportion for families with vaccinated children was 11%. Families with unvaccinated children were also the ones least satisfied with the way they were received at the CHC and the information given.

Parents from both groups expressed dissatisfaction with the way the staff provided immunization information and answered questions. Forty-four percent of the parents with unvaccinated children and 30% of parents with vaccinated children stated that not enough time was allocated for questions and discussion regarding vaccination ($p < 0.05$). Seventy-six percent of the unvaccinated group and 61% of the ones who vaccinated had discussed only the pros and not the cons of vaccination at the vaccination visit.

Ninety percent of the parents were given verbal information by a nurse. The parents who hesitated and later declined vaccination more often discussed the
Parental opinion regarding measles, mumps and rubella and the MMR vaccination

Thirty percent of parents with a vaccinated child and 4% of the parents with an unvaccinated child agreed completely with the statement that “modern vaccines are safe” (Table 1). Most parents agreed or partially agreed that vaccination does prevent disease and that measles, mumps and rubella may have serious manifestations and sequelae (Table 1). The statements used as arguments by the anti-vaccination movement (13), such as vaccination causes SIDS, vaccine can be replaced by vitamin C and vaccine causes the diseases they are supposed to prevent, were not in agreement with the opinions of the studied group (data not shown).

The median response levels of all statements in favour of vaccination were “agree” or “partially agree” in parents who had vaccinated their children, and for the statements against vaccination the median was “hesitant”.

The median response profile to the statements was more heterogeneous among parents with unvaccinated children. The median response was “hesitantly agree” to the statement that “modern vaccines are safe” and “agree” to the statement that “an adult who gets a childhood disease could get very seriously ill” (Table 1).

The overwhelming majority of parents who declined vaccination for their children agreed or partially agreed that vaccinations can cause chronic childhood diseases, and hesitantly agreed or disagreed that vaccines are safe.

Discussion

This study shows that most parents seemed confident that vaccination protects their child against measles, mumps, rubella and their sequelae. To most parents, this constituted sufficient reason to vaccinate. The MMR vaccination coverage based on parental reporting for the studied region was found to be even better than official statistics indicate. It is important that the official statistics reflect the true vaccination coverage. This study showed that a considerable number of children were vaccinated after the recommended age of vaccination. The main reasons for the delay were infectious diseases and allergies. Almost half of the children thought to be unvaccinated had received the MMR vaccination at a later time.

The number of children with postponed vaccination might increase due to the group of parents that are concerned about the safety of the vaccines. These parents need to discuss a wide range of thoughts on vaccination, which are not met by the health care system of today.

As much as one-fifth of the group of parents that finally chose not to vaccinate had not made up their mind regarding the offer to vaccinate the child at the health visit. This indicated that these families want and need information and an open-minded discussion that reflects both pros and cons with vaccination.

Vaccine safety has become a main concern for many parents. This is also true in our study, both among the vaccinated and the unvaccinated group. There are an increasing number of parents who hesitate or decide not to vaccinate because they are worried about safety. It is therefore important to establish a dialogue with parents rather than declining to discuss their greatest fears.

The challenge for personnel in the health sector will be to find a way of discussing issues not traditionally recognized by western medicine without parents feeling criticized or blamed, and that the information will need to be individualized because background knowledge differs. Health care professionals should especially target parents at high risk of not having their child vaccinated.

It is interesting to note that Gellin et al. (12), through their national telephone survey to 1600 parents, found that families regard nurses and doctors in the health sector as the most reliable source of information regarding vaccine information and advice about immunizations.

This, together with our findings, stresses the fact that vaccine information has to be improved and that vaccine discussion should be encouraged with all parents, but especially with parents that hesitate to vaccinate their child.

It is difficult to study why a small group of parents does not accept society’s offer to vaccinate their children free of charge. They are, as a group, perceived as active and caring parents but with a different set of beliefs on health and sickness. They feel they are not listened to and naturally they do not consent to a procedure they do not understand or believe in. Gust et al. have found a positive relationship between confidence in vaccine safety and reliance on a doctor for advice (15). We conclude from our study that the physician has to take more time to listen and discuss in order to strengthen the doctor–parent relationship. Other groups also recommend increased provider communication of vaccine safety and benefits to address parental concerns (15, 16).

The difficulties encountered with this study were a low response rate compared with other recent studies performed at CHCs in Göteborg (17). Two CHCs out of 27 did not participate fully because of the risk of conflict with parents with unvaccinated children. Nurses did not submit the name and addresses and instead distributed the questionnaire themselves. Even though we foresaw the difficulties, we decided to carry through the study, as it is one of the few, to our knowledge, that has addressed these parents directly. However, we did not anticipate
that health personnel would react negatively due to fear of anger from parents.

It is unfortunate that this group of parents feels misunderstood and mistreated, and it will take time to change the attitude among health personnel in order to prevent further misunderstanding. It is interesting that parents of unvaccinated children were more likely to report some knowledge of the MMR vaccination before a vaccination visit than parents with vaccinated children. On the other hand, parents with unvaccinated children had less accurate information about the vaccine. It has to be taken into consideration by health care personnel that parental knowledge might not be based on scientific data.

In conclusion, we find that parents who hesitate to vaccinate their children against measles, mumps and rubella need to be better taken care of by health professionals in order to keep up the achieved coverage.

Acknowledgements.—Financial support for this work was provided by Göteborg University. We wish to thank the staff at the Child Health Centres, Mirjam Johansson, research nurse, and Peter Pernevi, MD. We are thankful to the parents who participated.

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Received Oct. 20, 2003; revision received Mar. 31, 2004; accepted Apr. 10, 2004