

Research Paper

Follow-up of MMR Vaccination Status in Children Referred to a Pediatric Immunization Clinic on Account of Egg Allergy

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egg hypersensitivity, Measles-Mumps-Rubella vaccine, immunization, contraindications, child preschool, communication barriers

ABSTRACT

Objective: To determine timeliness and completeness of MMR immunization uptake and general immunization status of egg-allergic children referred to hospital for MMR vaccine who were referred back to their primary care providers with explanatory information that community-based vaccination is safe in these children.

Method: Referred children's immunization status obtained from referring practices. Where the practice had no record parents were contacted. Parents whose children had not received MMR were asked reasons for their choice. Timeliness of immunizations was examined for both MMR and the primary schedule. Practices referring more than one child to immunization clinic were analysed to determine whether previous letters from the immunization clinic influenced their referring practice.

Results: 82 children were eligible from 67 practices. MMR status was obtained for 78 (95% response rate). Of these 78, 73 (94%) received MMR vaccination with no reported adverse events: 8 (11%) on time, 54 (69%) late and 11 (14%) timeliness unknown. Five (6%) children had not received MMR vaccination. Three practices were unwilling to carry out MMR immunization of egg-allergic children, even after recommendation from the immunization clinic. Of the five parents whose children had not received MMR, two had actively decided against vaccination.

Discussion: 94% children received their MMR in primary care with no reported adverse effects. The current strategy utilised by the immunization clinic appears to result in MMR immunization of egg-allergic children. While the referral process may result in delayed immunizations, continued education of health professionals may improve timeliness and immunization rates.

INTRODUCTION

New Zealand (NZ) has a two-dose combined measles, mumps and rubella immunization (MMR) schedule given at 15 months and four years of age.

Components of the MMR vaccine are derived from cell cultures of the chick embryo. Historically there have been concerns over administering the vaccine to children with an allergy to egg proteins, with skin prick and intradermal testing with the vaccine initially recommended.^{1,2} However these tests have not proven to be useful predictors of an adverse reaction following vaccination.^{1,3-5} Many studies now have found that egg allergy is not a contraindication to administering MMR.¹⁻¹¹

In NZ, the Auckland Starship Children's Hospital runs a special immunization clinic for children who have had previous adverse reactions to immunizations. Children are referred to this clinic by their general practitioner (GP) or practice nurse. If a child is referred because of egg allergy the clinic follows the recommendations supported by the Committee on Infection and Immunization of the Royal College of Paediatrics and Child Health, and the British Society of Allergy and Clinical Immunology: that only those children with an anaphylactic reaction to eggs or those with egg allergy combined with chronic asthma need to be immunized in a hospital setting.⁸ Other children with egg allergy can be safely immunized in a primary care setting. The immunization clinic therefore replies to referral letters from primary health care recommending that it is safe for them to administer MMR vaccine to egg-allergic children in the general practice setting, and provides written information about MMR vaccination and egg allergy.

While the guidelines are cautious and recommend that children who have egg anaphylaxis with cardiorespiratory symptoms should be vaccinated in a hospital, studies that included anaphylactic children have reported that MMR was received uneventfully,^{1,3} suggesting that these children are at no greater risk of a serious adverse reaction than the general population.⁹

Lack of awareness of MMR vaccine contraindications leads GPs and PNs to refer egg-allergic children to the immunization clinic. This may result in children being vaccinated at a later date than recommended, and such a delay can leave children vulnerable to infection. Alternatively these children may fail to receive MMR at all.

The purpose of this study was to determine the timeliness and completeness of MMR immunization uptake and general immunization status of children who were referred to the Starship immunization clinic for MMR vaccine on account of egg allergy, but who were not given appointments. We wished to establish whether the standard letter sent to general practices resulted in timely recall for MMR immunization in these children, and to explore the possible reasons why some of these children may not have been immunized against MMR. Investigating the outcomes of these referred children helps review of the immunization clinic's current practice and may allow for improvement of immunization rates in egg allergic children.

METHOD

The study took place at the Immunization Advisory Centre, Department of General Practice and Primary Health Care, School of Population Health, University of Auckland and the Immunization Clinic, Starship Hospital, between November 2004 and February 2005.

The population sample consisted of children with either proven or suspected egg allergy referred to the immunization clinic by their GP or PN between April 2001 and August 2004 because of concern about MMR immunization. They were not seen by the clinic but referred back with the recommendation that they be immunized at their general practice. Patients referred to the immunization clinic for reasons other than egg allergy (for example because of a previous adverse reaction to MMR) were excluded from the study. Ethical approval was obtained from the Auckland Ethics Committee.

Following a faxed participant information sheet with details of ethics approval as support of the authenticity of the researcher, the PNs of the referring practices were telephoned and asked for details concerning the referred children's immunization status (uptake and timeliness of the whole child immunization schedule, not just MMR). PNs reviewed the medical records of the patients to check their current immunization status and determined whether they were still enrolled patients with that practice. For those children where the practice had no record of subsequent MMR vaccination the researcher telephoned the parent. For children who had not received MMR, parents or caregivers were interviewed about the reasons for their choice. Because the telephoning researcher was designated an honorary member of the immunization clinic staff, assisting the clinic in their quality improvement (practice review) activity, prior consent was not required to telephone the parents, who gave their verbal consent to an interview. All

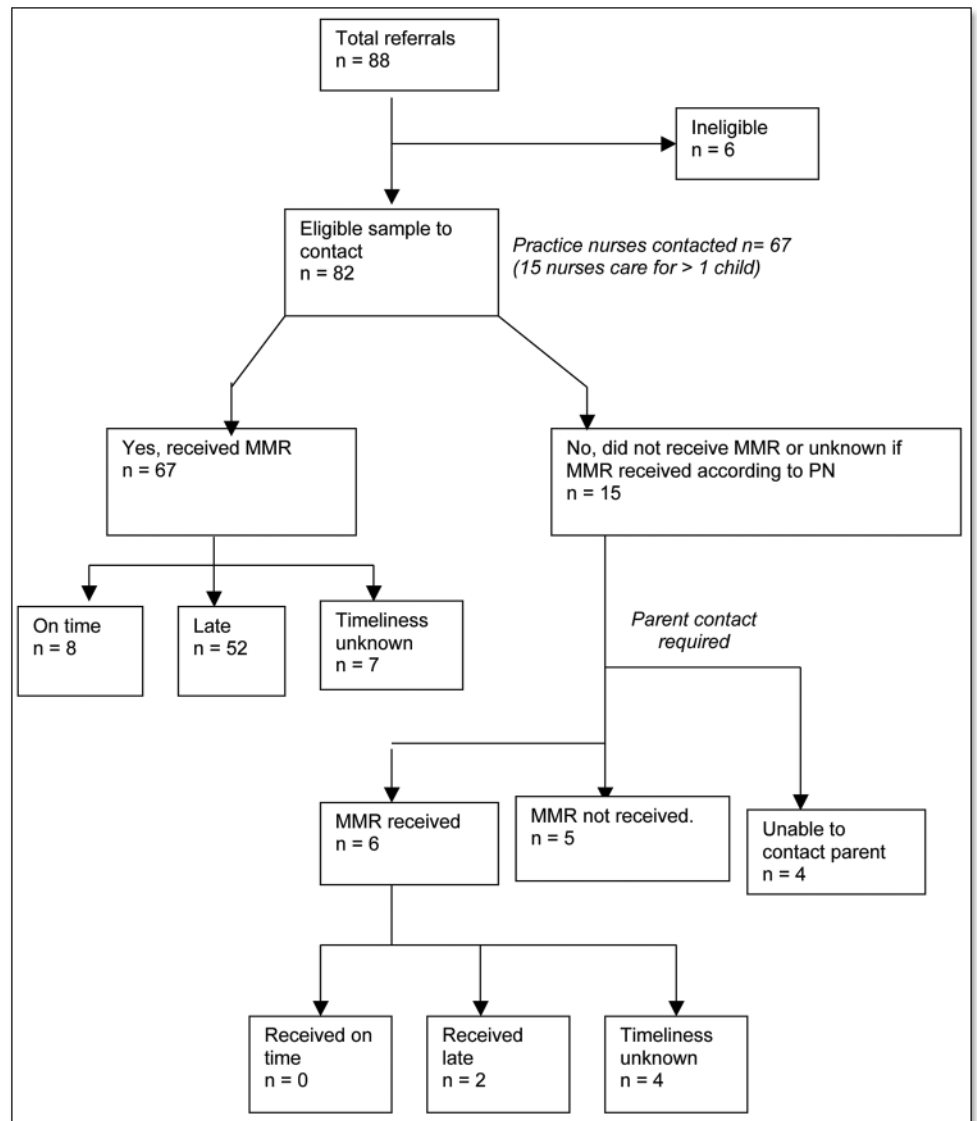


Figure 1. MMR status of referred children.

data were entered anonymously, with no identifying patient details. Any questions of a clinical nature were referred back by the researcher to the general practice staff or to the Immunization Advisory Centre (IMAC) telephone hotline. Parents who could not be contacted by telephone were also sent letters.

The NZ Ministry of Health issues all newborn children with a WellChild Tamariki Ora Health Book as part of the free WellChild service. WellChild providers including public health nurses and general practice staff enter the results of developmental and health assessments and immunizations in this book. This is used by parents as a record of the child's immunization events that they need to show when starting preschool and school. For parents who mislay the WellChild book the general practices provide a replacement immunization record card.

The timeliness of immunizations was examined for both MMR and the primary schedule. For the purpose of this study a timely immunization was defined as received within 30 days of the recommended age, and a late immunization received more than 30 days after the recommended age. Where the PN had no details of immunization on record the child's status was categorised as unknown. With respect to the primary schedule if one or more of the immunizations in the primary schedule was not received the child's status was classified as 'incomplete'. Similarly, if it was not known if

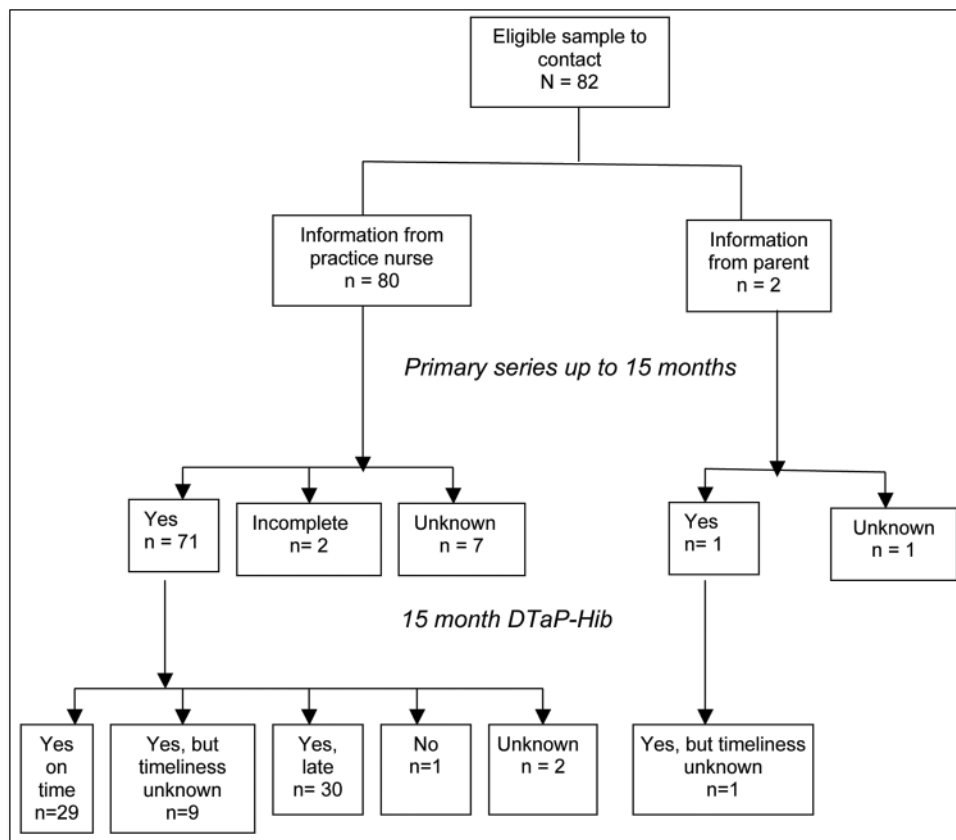


Figure 2. Primary schedule status of referred children.

one or more was received it was classified as 'unknown'. If the immunization history was not available from the PN the information was obtained from the parent.

Practices who referred more than one child to the immunization clinic were analysed to identify the time elapsed between referrals to determine whether previous letters from the immunization clinic had had an effect on their referring practice.

RESULTS

Between April 17, 2001 and August 19, 2004, 88 children were referred to the immunization clinic and their GP posted a response letter. Of these, six were ineligible for inclusion in this study as they were referred for a previous reaction to MMR vaccine not related to egg allergy, or for concerns relating to another vaccine.

For some children referral to the immunization clinic occurred when children were already late for their vaccines. The average age for referral for 15 month MMR immunization was 16 months and for the four-year MMR immunization was 5 years 8 months. There were 46 male and 36 female children.

A total of 67 practice nurses were contacted to establish the immunization status of the 82 eligible children. Details of the results are summarized in Figure 1. MMR status could not be obtained for four children from either the practice nurse or the parents, giving a response rate of 95%.

Of the 78 children whose MMR status was determined, 73 (94%) had received the MMR vaccination with no reported adverse events. Eight (11%) had received it on time, 54 (69%) received it late and for 11 (14%) the timeliness was unknown. There were five (6%) children who had not received the MMR vaccination at all.

The majority, 63 (81%), were referred for their 15 month MMR vaccination, of whom seven went on to receive MMR on time. Only one child referred for the four year MMR vaccination went on to receive it on time.

Eighty-eight percent (72/82) of the referred children had received their primary immunizations according to the schedule up to 15 months, excluding MMR, on time, two were incomplete and this was unknown for 8 children (see Fig. 2). Eighty-four percent (69/82) had received the 15 month DTaP-Hib (Diphtheria Tetanus acellular pertussis—*Haemophilus influenzae* type b) with 29 of these known to be on time. Twenty-three children who received their 15 month DTaP-Hib vaccination late received their 15 month MMR vaccination at the same time.

Of those 15 children for whom there were no record or had not received MMR vaccination following referral, 11 parents were able to be contacted. Six of the 11 had gone on to receive the MMR vaccination. Three of those six had received the MMR vaccine at a practice other than the one that referred them. The parents said that the original GP was unwilling to carry out the immunization, therefore it was sought elsewhere by the parent. The parents of five children who had not yet received their MMR vaccination were contacted for an interview. One parent was not further questioned, even though their child had not received MMR, as they were intending on taking part in a MMR catch-up program at school.

Three of the four interviewed parents had not been contacted by their GP regarding the return-referral letter. While they were aware that their child was referred they did not know the outcome nor the information that the immunization clinic sent back. All four children had eczema with one also having a history of hayfever allergies. Two of these parents would have preferred to have their child immunized in a hospital setting if possible. Difficulty in accessing immunization services was not found to be the reason for these children remaining un-immunized. Lack of information was identified as a reason for having low confidence in MMR vaccination. Two parents would have preferred more information regarding why MMR is necessary when compared to other vaccines, the possible consequences of remaining un-vaccinated and requested examples of children in a similar situation to theirs who have come out with positive results.

Responses from the interviews with the four parents whose children had not received MMR were analysed. Two parents were of the opinion that there was nothing that would increase their confidence in getting their child vaccinated against MMR. One of these two children had otherwise been fully vaccinated and the other child's immunization history was unknown. The other two parents expressed a need for more information ("Why is it all necessary? There are so many vaccinations required"). One parent displayed particular concern and had actively sought information regarding the MMR vaccine and "what it's cultured on" from an allergy awareness magazine and from the internet.

There were 34 children who were under the care of 15 practice nurses. The dates of referral were analysed to see if the response letter sent out had had any effect on future referrals. While ten referrals from five GPs or practice nurses were made within a month of each other, the majority were not. Five GPs or practice nurses had sent another referral more than two years after receiving the first response letter from the immunization clinic.

DISCUSSION

Due to low immunization coverage NZ experiences repeated epidemics of measles, with seven deaths occurring in 1991. In 2000 the national coverage estimate for the 15 month MMR was estimated as 85%. There is no national data on the coverage for the four year old MMR vaccination. However the national target rate is 95% for the overall rate (including the 4-year booster of 90% by five years of age) in order for measles to be controlled.¹² A predicted epidemic in 1997 was minimised by a mass immunization campaign.¹² The low immunization rate means that community immunity is insufficient to protect vulnerable children and NZ children will suffer from further epidemics of measles. Consequently they are susceptible to infection with possible consequences such as encephalitis, pneumonitis and in 1/1000 cases, death.¹³

A strength of this study was the high response rate (95%) with information from only four of the 82 eligible children unable to be obtained. A limitation was having inaccurate or incomplete immunization records. Incomplete or a lack of up-to-date immunization documentation can be a barrier to immunization.¹⁴ The dates of all immunizations received was not able to be obtained in this study. The current development of a National Immunization Registry accessible to all relevant health professionals should help to reduce the incidence of such record scattering.

Higher rates of timely immunizations were observed with the 15 month DTap-Hib compared to 15 month MMR immunizations. A delay in receiving a scheduled immunization proportionately increases the numbers of those who are unprotected, thus increasing risk of infection and decreasing MMR immunization rates.¹⁵ Research supports the fact that health professional knowledge is a major barrier and can lead to missed opportunities, therefore continued education is warranted.^{14,16-18} If health professionals had a more comprehensive knowledge of the vaccine contraindications, then the timeliness of MMR immunizations could also be improved.

Usually the 15 month DTap-Hib and 15 month MMR vaccines are given at the same visit. The referral process to the immunization clinic in addition to delaying MMR immunization, sometimes results in late 15 month DTap-Hib immunizations. Education of health providers would help to ensure referrals are only done when necessary so not only MMR timeliness but also DTap-Hib timeliness is improved.

Other potential reasons for missed opportunities were identified. Three practices were unwilling to carry out MMR immunization of an egg allergic child, even after recommendation from the immunization clinic. The interviewed parents of children who had not received their MMR vaccine indicated that they considered there was not enough information available to explain the purpose and the urgency in receiving the vaccines in the schedule. Health providers play a vital role in informing parents about all aspects of immunization and act as an important source of information.

Research indicates that health professional knowledge is one important predictor of immunization coverage.^{14,16,17} A lack of knowledge concerning vaccine contraindications, can lead to missed vaccination opportunities. In a NZ study of health professionals, 57% of practice nurses (PN) and 64% of GPs believed that egg allergy, presenting as a rash, was a contraindication to receiving the MMR vaccine.^{16,17}

It is reassuring that 94% of the children who were able to be followed up had received their MMR in primary care with no reported adverse effects following referral back to their GP by the

immunization clinic. However the referral and concern over egg allergy as a contraindication often led to late immunization. Furthermore not all the practices had contacted families to eliminate their concerns, indicating the need for additional education and outreach.

From collated data, PNs or GPs who referred more than once are likely to be concerned over the possibility of a reaction, or are unaware of current recommendations. One possibility is that these practices may be larger and have proportionately more practice nurses and GPs or high staff turnover. All the staff may not be aware of the referrals or the previous responses received from the immunization clinic advising that it safe to immunize an egg allergic child with MMR. Generally it is the GP who actually writes the referral letter so further awareness campaigns regarding contraindications could also target them. The implementation of a continued vaccine education programme will help to reduce the number of referrals from the same practice. As well as face-to-face seminars, IMAC has just introduced a web-based GP Immunization Education Programme which aims to improve knowledge about immunization contra-indications.

Updating the NZ immunization handbook, a reference available to most vaccine providers in NZ,¹² may help to provide clearer guidelines for immunising egg allergic children. The development of an information pamphlet targeted at parents would help to address concerns raised by interviewed parents in this study. Such a pamphlet could be included with the return-referral letter to the GP. In this way it could not only provide more confidence for the parents, but it may also help to further educate the staff at the referring practices.

The current strategy utilised by the Starship immunization clinic appears to be a mostly effective method of ensuring MMR immunization of egg allergic children. Changes in the way immunization records and referral letters are processed may help to reduce errors and confusion. While immunizations appear to be delayed as a result of the overall referral process, continued support and education of health professionals is likely to play a major role in improving timeliness and immunization rates. The immunization clinic cannot cope with the workload of giving MMR vaccines to all egg-allergic children, but may be able to offer vaccination on the rare occasions that either the general practice staff or the parents remain uncomfortable about community-based vaccination. Feedback to practices that these children were vaccinated without any adverse events may help persuade staff that this is safe to do in their practices.

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