CONTROVERSIES IN CHILDHOOD IMMUNIZATION EARLY VS. LATE 2-DOSE MEASLES SCHEDULES

JOSEFINA B. CADORNA-CARLOS, M.D.

INTRODUCTION

To date, measles remains to be the most common vaccine preventable cause of death among children in the world. Based on data available to WHO as of April 1992, worldwide coverage of children with a single dose of measles vaccine before 1 year was 80%. With this level of coverage, WHO estimates that more than 89 million cases of measles and 1.6 million measles-associated deaths were prevented in 1991. However an estimated 41 million cases of measles-associated deaths occurred globally in 1991.[1]

Measles continue to rank as one of the leading cause of morbidity and mortality in the Philippines. In 1990, it was the ninth leading cause of morbidity and eighth leading cause of mortality in all age groups. Further review shows that the attack rate and mortality rate are highest below 1 year of age (729/100,000 and 40.1/100,000 respectively compared to the overall rates of 69.2/100,000 and 5.6/100,000).[2]

Despite the global as well as the rational coverage of a single dose of measles vaccine, measles continues to occur, both in the unimmunized and the immunized[3] (Table 1, Figure 1). As an alternative strategy for measles control, two dose schedules are being used routinely in some developing countries. On the other hand, some developed countries like the United States, which have made elimination goals and which have achieved high coverage with one dose of vaccine, have also adopted 2-dose schedules.

REVIEW OF LOCAL LITERATURE

The WHO and our DOH recommend 9 months as the age of measles immunization. However, San Lorenzo Hospital Sentinel Surveys have shown that 12-18% of measles cases occurred below 9 months of age. Similar experience has been reported in other areas of the country.

While there is agreement that infants below 6 months of age cannot mount a significant antibody response to current measles vaccines because of the passively transferred maternal antibodies,[4] our local experience in the ages 6-9 months is different.

Chan, et al, determined the maternal passively transferred antibodies using microtiter hemagglutination-inhibition test among 230 infants from 7 barangays in Manila. Maternal antibodies were present in 90 and 84% of 3 and 4 month old infants but 21-25% of 5-7 month old infants had lost their passive antibodies.[6] Aguila, et al, determined the prevaccination titers of 905 infants from 5 barangays in Quezon City and found that almost half of the 4 month old infants (48.1%) no longer have maternal antibodies by the ELISA method. At 6 months of age, 87% were negative for maternal antibodies.

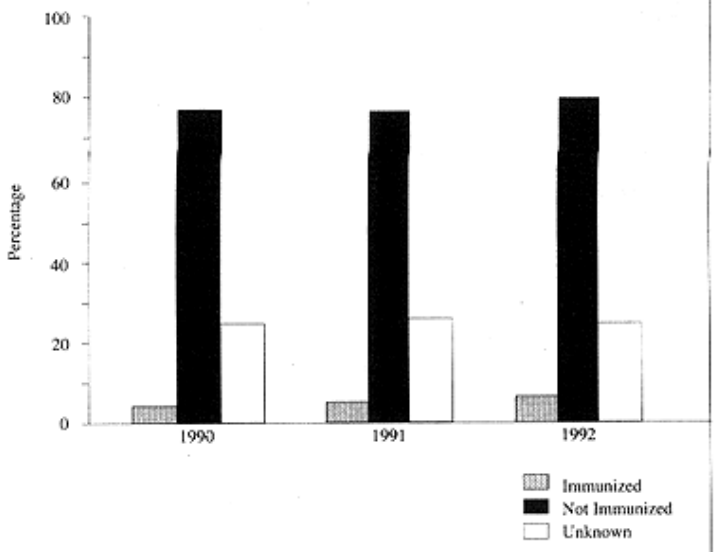
These two groups of investigators have likewise conducted studies in the efficacy and safety of measles vaccine given earlier than 9 months. Aguila, et al, gave Schwartz vaccine to 4, 5, 6, and 7 month old infants and got an overall seroconversion rate of 69.1% at 8 weeks post-vaccination. The rate was highest for the six month old infants (80.7%). Chan, et al, conducted a prospective study on 127 infants at Makati Medical Center using either Schwartz or AIK-C vaccine. Seventy-five to 85% of vaccinated infants seroconverted to AIK-C and Schwartz respectively, and though the extent of humoral antibody responses as represented by the geometric mean titers (GMT) were low, they were above the protective HI level (1.5).[7] Both studies reported minimal adverse effects.

Aguila, et al, reported a decline of antibody levels 16 weeks post-vaccination and at 10-12 months post-vaccination. Only 43% in a sample of 42 infants had detectable antibodies. They reported however that

Table 1. Percent Measles Coverage of Target Population vs. Global Coverage and Measles Cases and Deaths (FETP-DOH) 1990-92

	1990	1991	1992
% Coverage of Target Pop. (Phil.), MCH-DOH	84.76	88.14	89.88
% Global Coverage (WHO)	80.00	78.00	80.00
No. of Measles Cases (Deaths), FETP Report	6192.00 (361)	4611.00 (288)	9980.00 (662)

Figure 1. Measles Cases By Immunization, FETP, 1990-92



a 2 year follow up of their vaccinated subjects did not show a single case of measles. Chan, et al, reported that 31.11% of their vaccines sustained their titers 7 months post-vaccination but that 62.22% showed a decline with 44.44% decreasing to non-protective levels. Revaccination of these same subjects gave a 90% seroconversion, which was significantly higher compared to seroconversion following primary vaccination.[8]

ALTERNATIVE IMMUNIZATION SCHEDULES

The goal of the WHO EPI is the reduction by 95% in measles deaths and a reduction by 90% in measles cases compared to prevaccination levels by 1995. With the present level of global coverage of measles vaccine at 80%, some countries have lower coverage than this, and in these countries, raising the coverage of single dose measles immunization is the priority. On the other hand, as an alternative strategy for measles control, 2-dose schedules are being used in some developing and developed countries.[9]

A. EARLY 2-DOSE MEASLES SCHEDULE

1st dose: 6-9 months of age

Aim: To prevent measles cases and deaths prior to the recommended age of immunization.

2nd dose: 3-6 months after the 1st dose

Aim: To decrease vaccination failure

This schedule is appropriate for countries with high age-specific attack rates in young children (especially in the first year of life).

B. LATE 2-DOSE MEASLES SCHEDULE

1st dose: 9-15 months of age

2nd dose: at school entry

Aim: To prevent cases in older vaccinated children not protected by the 1st dose (primary vaccine failure) or whose immunity has waned (secondary vaccine failure).

This late 2-dose measles schedule is more appropriate for industrialized countries with good immunization coverage and when measles virus transmission among young infants is limited.

RECOMMENDATION

Early 2 dose measles schedule

1st dose: at age 6 months

2nd dose: 6-9 months after the first dose as single dose or in combination with mumps and rubella

REFERENCES

1. Rosenthal, SR and Clements, CJ. Two Dose Measles Vaccination Schedules. WHO Bull OMS Vol 71 1993; pp. 421-428.
2. Philippine Health Statistics 1990; Health Intelligence Service, DOH.
3. Field Epidemiology Training Program (FETP) 1992 Report, DOH.
4. Markowitz, LE and Orenstain, WA. Measles Vaccines. PCNA 37(3) Jun 1990; pp. 603-625.
5. Chan VF, et al. A Preliminary Report: What is the Optimal Age for Measles Vaccination Among Filipino Infants? Acta Med Philipp 1991; pp.124-129.
6. Aguila, FS, et al. Measles Immunity Profile of Young Filipino Infants: Pre and Post Measles Vaccination. Phil J Pedia 41(4), Oct-Dec 1992; pp. 329-345.
7. Chan VF, et al. Measles Immunization: I. Immune Response of Six-Month Old Filipino Infants to Schwartz and AIK-C Measles Vaccines. Phil J Ped 41(4), Oct-Dec 1992; pp. 346-354.
8. Chan, VF, et al. Measles Immunization: II Booster Immune Response of Infants Who were Primed at Six Months of Age. Phil J Ped 41(4), Oct-Dec 1992; pp. 355-366.
9. WHO Measles Control in the 1990s: Plan of Action for Global Measles Control. WHO/EPI/GRN/92.3.

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OTHER REFERENCES

1994 Red Book, Report of the Committee on Infectious Diseases, American Academy of Pediatrics, 23rd ed, 1994.

Mandell GL, et al: Principles and Practices of Infectious Diseases, 3rd ed, Churchill Livingston, NY, 1990.