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<THE TOPIC OF THIS MONTH>
Measles in Japan, 2012

WHO Western Pacific Region to which Japan belongs targeted measles elimination by 2012 (see p. 24 of this issue). The current verification criterion of measles elimination of the Region is "the absence of endemic measles transmission* of endemic virus for more than three years in the presence of a well performing surveillance system, which is supported by genotype analysis of the isolates."

*Endemic measles transmission is defined as "the existence of continuous transmission of *indigenous or imported* measles virus that persists for ≥12 months in any defined geographic area" (WHO, WER, 85: 490-495, 2010).

Measles incidence under the National Epidemiological Surveillance of Infectious Diseases: Infectious Diseases Control Law requests notification of all measles cases since January 2008 (IASR 29: 179-181, 2008 & 29: 189-190, 2008). From week 1 to week 52 of 2012, total 293 cases were reported, among which 216 cases including 75 "modified" measles were supported by laboratory diagnosis but 77 cases were supported by clinical diagnosis (as of January 8, 2013). In 2012, measles cases were reduced to 2/3 of those in 2011 (from 434 cases or 3.58 per million population in 2011 to 293 cases or 2.32 per million population in 2012) (Fig. 1).

In 2012, the largest number of measles cases were reported from Tokyo (84 cases) followed by Aichi (39 cases), Saitama (32 cases), Kanagawa (29 cases) and Chiba (23 cases). The total cases in four prefectures within the metropolitan area, Tokyo, Saitama, Kanagawa and Chiba, occupied 57% of all the reported cases. Twenty-one prefectures reported zero cases (Fig. 2 in p. 23), among which 12 prefectures reported zero cases in successive two years (see p. 37 of this issue). In 2012, 32 prefectures, in contrast to 19 prefectures in 2011, reported <1/million population, the target as a measure of near measles elimination (WHO, WER 85: 490-495, 2010).

The sex ratio was 158 males vs. 135 females. As for age distribution (Fig. 3), one year olds were the highest in number (29 cases) followed by zero year olds (16 cases). The teens that occupied 43% of the total in 2008 occupied only 13% in 2012. In contrast, 20s and 30s increased in proportion, and as a consequence adults occupied 58% of the total measles cases in 2012.

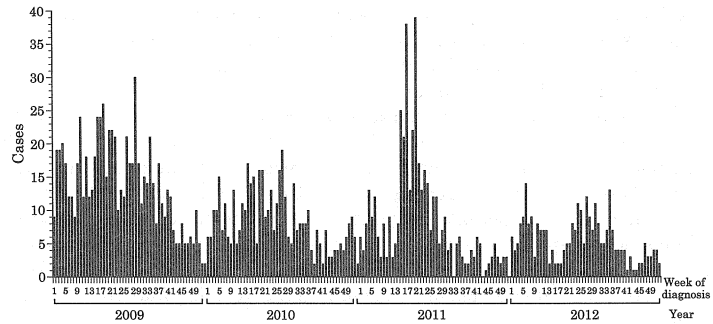
Among the measles patients, 84 had received no dose, 78 only one dose and 17 two doses. The vaccination history of the remaining 114 was unknown. The all 16 zero-year-old cases had received no vaccination. Among 29 one-year-old cases, 15 had received no dose and 13 only one dose. Among the 132 cases in their 20s and 30s, 22 had received no dose, 35 only one dose and 3 two doses.

Two schools, a primary school and a secondary school, temporarily closed in September 2012 in Miyazaki Prefecture on account of measles outbreaks (see p. 33 of this issue).

Isolation and detection of measles virus: The measles virus genotype D5 that had been endemic in Japan during 2006-2008 has not been detected later than May 2010. Since 2009, measles viruses whose genotypes are those of foreign-origin were detected (Table 1 and Table 2 in p. 23). In 2012, 45 D8 strains were isolated, among which 24 were derived from an outbreak in Aichi (IASR 33: 66, 2012) and 8 were from an outbreak in Miyazaki (see p. 33 of this issue). Other isolates were 10 D9 strains, among which 5 were from an outbreak in Okayama (IASR 33: 166-167, 2012); 7 H1 strains, among which 5 were from an outbreak in Fukushima (IASR 33: 242-244, 2012); and 6 D4 strains, which were all from sporadic cases.

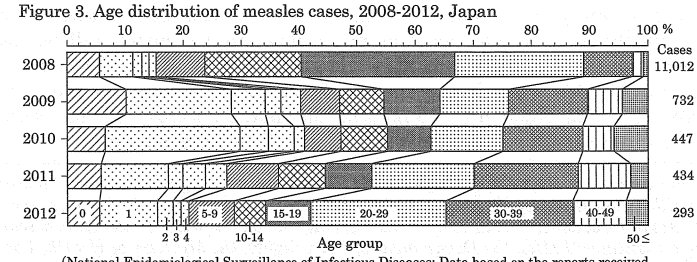
The National Epidemiological Surveillance of Vaccine-Preventable Diseases (see p. 25 of this issue): WHO considers that measles elimination requires 95% population immunity

Figure 1. Weekly measles cases, 2009-2012, Japan



(National Epidemiological Surveillance of Infectious Diseases: Data based on the reports received before January 8, 2013)

Figure 3. Age distribution of measles cases, 2008-2012, Japan



(National Epidemiological Surveillance of Infectious Diseases: Data based on the reports received before January 8, 2013)

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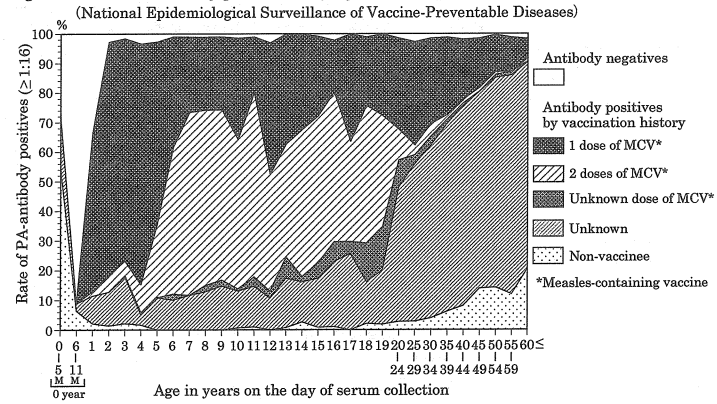
(THE TOPIC OF THIS MONTH-Continued)

against measles virus in each birth cohort. In Japan, gelatin particle agglutination (PA) assay is conducted and the titers above 1:16 are considered positive. In 2012, the antibody-positive rate became ≥95% in all the age groups ≥2 years for the first time, which proved effectiveness of the two routine doses (Fig. 4). However, as the antibody-positive rate in 1-year age group was 67%, earliest vaccination after attaining 12 months of age is desired.

Figure 4. Measles antibody prevalence by age, 2012, Japan
(National Epidemiological Surveillance of Vaccine-Preventable Diseases)



It has been considered that protection of individuals from symptomatic measles infection requires titer 1:128 or higher. However, the antibody titer of more than 15% of age groups of 0, 1, 4 and 5 years was less than 1:128.

Vaccination rate (see p. 28 of this issue): Since FY2006, routine immunization in Japan has adopted measles-rubella combined vaccine, which is administered in two doses, the first dose to children of one year (1st vaccination) and the second dose to children preceding one year before the school entry (2nd vaccination) (IASR 27: 85-86, 2006). In addition, from 2008 to 2012, supplementary vaccination was conducted to children whose age corresponds to the age of the first year class of the secondary school (3rd vaccination) and to those whose age corresponds to the age of the third year class of the high school (4th vaccination) to ensure two doses in these age groups too (IASR 29: 189-190, 2008).

The vaccination rate of measles-containing vaccines (M, MR) in FY2011 was 95% for the 1st (96% in 2010), 93% for the 2nd (92% in 2010), 88% for the 3rd (87% in 2010) and 81% for the 4th (79% in 2010). The coverage of the 1st vaccination exceeded 95% (targeted coverage rate) successively in 2011 and in 2012.

For further increase of vaccination coverage: Consequent to the introduction of the 3rd and 4th vaccinations, there was a great reduction of measles cases under 20 years of age (Fig. 3). So as to achieve the measles elimination, local governments are requested to make further efforts to attain ≥95% vaccine coverage not only for 1st but also for 2nd, 3rd and 4th vaccination. According to the questionnaire-based survey destined to municipalities, towns and villages, which was conducted by a research group supported by Ministry of Health Labour and Welfare (MHLW), factors that played an important role in attaining coverage ≥95% were (1) timely reporting on the vaccine coverage in the community level, (2) identification of unimmunized children so as to recommend each unvaccinated child to go to vaccination by mail and (3) preparatory health check conducted in October and November in previous year of the school entry, where immunization is recommended to children with insufficient vaccine doses (see p. 31 of this issue).

Unvaccinated persons belonging to target cohorts of the 2nd, 3rd and 4th vaccinations in FY2012 are advised to be vaccinated before March 31, 2013, as public expense will not cover the vaccination after this date. During "the Children's Immunization Week", from March 1 (Friday) to March 7 (Thursday) in 2013, some local medical association will open clinics on Saturday, Sunday and evenings for vaccination. The eligible persons are advised to be vaccinated at the earliest occasion before the end of March this year.

Importance of laboratory diagnosis: In 2012, one fourth of the notified cases were diagnosed by symptoms without laboratory confirmation. More than half of the laboratory diagnosis was based on IgM tests. Measles cases weakly positive for IgM or clinically suspected measles are often cases infected by rubella virus, B19 virus, HHV-6, HHV-7, enteroviruses, etc, which occasionally develop skin rash (see p. 34 of this issue). Therefore, direct detection of measles virus genome, such as by PCR or virus isolation, is important. Prefectural and municipal public health institutes (PHIs) and National Institute of Infectious Diseases (NIID) have established the collaboration network for laboratory diagnosis based on PCR testing. In 2011-2012, 40% of the laboratory-diagnosed specimens were PCR-tested by PHIs (see p. 36 of this issue). Physicians are requested to obtain clinical specimens in appropriate timing and the person in charge of transportation should keep the samples under the appropriate temperature. The PHIs should observe the required temperature control of the received specimens during the storage and testing (IASR 33: 309-310, 2012).

Measures to be taken from now: In 2012, the "foreign strains" were isolated not only from the imported cases but also from sporadic cases without history of overseas travel (Table 2 in p. 23, see p. 36 of this issue and http://www.nih.go.jp/niid/en/iasr-measles-e.html). For measles elimination, important are maintenance of high vaccine coverage and a system that allows tracing of an outbreak back to the infection source and immediate interruption of virus transmission. The principle of "immediate response to any one measles-suspected case" should be applied to all the cases. The response includes active epidemiological investigation supported by laboratory and prompt measures against virus spread, which requires coordination between medical facilities, health centers, PHIs and NIID. So as to prevent importation, people including adults are advised to complete measles vaccination before going abroad. It is also important to conduct a vaccination campaign to those going abroad.

Japanese government recently revised the "Special Infectious Disease Prevention Guidelines on Measles (MHLW, December 28, 2007)". According to the revised guidelines adopted in April 2013, Japan targets elimination of measles by FY2015 to obtain WHO's certificate of measles elimination and projects maintenance of the measles elimination status thereafter. According to the Guidelines, a measles elimination verification committee will be established (see p. 39 of this issue). Cases notified by a physician will be examined for clinical symptoms, laboratory findings, vaccine histories, and possibility of contact with measles patients. If the possibility of measles is excluded as a consequence, the doctor in charge will be requested retraction of the notification. In order to prove measles elimination status, it is imperative to obtain clinical specimens in timely manner and to examine the possibility of endemic circulation through genotyping.

The statistics in this report are based on 1) the data concerning patients and laboratory findings obtained by the National Epidemiological Surveillance of Infectious Diseases undertaken in compliance with the Law Concerning the Prevention of Infectious Diseases and Medical Care for Patients of Infections, and 2) other data covering various aspects of infectious diseases. The prefectural and municipal health centers and public health institutes (PHIs), the Department of Food Safety, the Ministry of Health, Labour and Welfare, quarantine stations, and the Research Group for Enteric Infection in Japan, have provided the above data.

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