MEASLES *update*

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MEASLES ELIMINATION: TIME TO CATCH-UP

Richard Schabas, Ontario Ministry of Health, Toronto*

Measles elimination has hovered on the fringes of the public health agenda in Canada for more than a decade. Ontario adopted measles elimination as a public health objective in 1989, as did the Canadian Measles Consensus Conference in 1992. While it has always been an attractive goal and one that has, at times, seemed tantalizingly close, we have yet to show the necessary resolve to achieve it.

There are several reasons for this indecisiveness. First, measles elimination will be more difficult than originally thought. Specifically, universal single-dose coverage will not be adequate. A two-dose schedule, with its attendant additional expenses, will be necessary.

Second, measles immunization is a victim of its own success. Single-dose coverage has been highly effective in dramatically reducing measles rates. While we continue to see outbreaks, and they are expensive to manage, the public health danger of measles is a shadow of its former importance.

Third, public health has felt the pressure of competing demands and shrinking resources. Public health issues, like smoking and AIDS, dwarf measles by their importance. And, all too often we much tackle them without sufficient new resources.

Still, events march on. External forces are pushing forward the measles elimination agenda. These include the international popularity of measles elimination. The enthusiasm with which it has been pursued in other countries of the Western Hemisphere makes Canada's procrastination stand in greater relief. The current situation, with Canada a relative hotbed of measles activity, is unsustainable.

Presentation of maculopapular rash in generalized measles
Courtesy of Dr. A. Bentsi-Enchill

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Canada

Another important factor is the evolution of professional guidelines towards support of a two-dose measles protocol. Private physicians, wanting to provide the best care to their individual patients, are already adopting this standard. In Ontario, at least, they are using government-funded vaccine. This approach is obviously unsystematic and inefficient. If we proceed down this road, Canada will end up incurring most of the costs of a two-dose schedule without achieving the benefits of measles elimination.

In addition, there is the continued unwillingness of both the public and public health professionals to tolerate measles outbreaks. These outbreaks appear to be an unavoidable cost of a one-dose schedule. Furthermore, containment efforts are very expensive. The most cost-effective approach might well be to ignore these outbreaks and let them run their course, but this would be unacceptable. Better to spend our resources preventing these outbreaks than trying to control them.

In summary, I believe that debate about whether or not to accelerate our measles elimination activity through a two-dose schedule is moot. Events, both international and domestic, are making that decision for us. The key question now is how we proceed to introduce a two-dose schedule. There are a number of options.

Incremental approaches, where a specific age is immunized either by private physicians or by public health efforts, will eventually achieve our goal. They have the advantage of relatively low cost in any given year. Their major disadvantages are that they will not eliminate outbreaks for some time and they will still invite ad hoc physician catch-ups.

By far the most attractive approach, in my view, would be a nationwide "blitz" campaign delivered to all school children by public health staff over a period of three to four weeks. This approach has a number of advantages.

First, it would achieve our goal quickly and decisively. It would eliminate school-based outbreaks, our major problem in recent years. Also, we would be seen to act decisively — an important boost to public confidence in public health.

Second, this approach is feasible in Canada. Recent experience with school-based hepatitis B programs and community immunization to control meningococcal outbreaks has shown that public health can achieve very high levels of target population coverage quickly and effectively. Experience gained in these other programs also means that we are learning how to deliver these kinds of programs efficiently. The recent successful measles catch-up program in the United Kingdom underscored the feasibility of this approach.

Third, this approach should minimize costs. The massive buying power of a national catch-up, requiring five million doses, and our ability to use large multi-dose vials would ensure an excellent price. The UK campaign, which used combine measles/rubella products, purchased its vaccines at about $1.50 per dose. In contrast, we currently pay about $8.00 per dose for measles/mumps/rubella vaccine. Public education costs would also be minimized. Indeed, we could expect enough media coverage of this event — probably the largest Canadian mass immunization campaign ever — that it would be largely self-promoting.

Fourth, a program of this kind would open up the possibility of a complementary campaign to improve rubella coverage. Congenital rubella syndrome has not disappeared. Whether or not a school-based program is the solution to this problem is still an open question. If, however, the incremental cost of using a combined measles/rubella vaccine is small, then this approach merits serious consideration. Canada should move decisively towards measles elimination through a school-based second-dose catch-up program followed by adoption of a routine two-dose schedule. If we act quickly it is still possible to take this step in the coming school year. Our disease control activities could then move on to other important issues.

MEASLES IN CANADA, 1995 (as of August 8)

Paul Varughese, Childhood Immunization Division, Bureau of Communicable Disease Epidemiology, LCDC, Ottawa

From January 1 to August 8, 1995, a provisional total of 1,802 measles cases (6.1/100,000 population) has been reported in Canada. This is 3.8 times greater than the 478 cases reported for the same period in 1994. Following remarkable increases in the number of cases in April and May, the incidence peaked in June with over 700 cases. Data since July show a downward trend, although more recent reporting is less likely to be complete at this time. Sixty-eight percent of the cases were reported as outbreak-associated. Figure 1 shows the trend in reported incidence by month from January 1, 1991 to August 8, 1995.

During the past seven months, seven of the 10 provinces have reported measles activity and the number of cases has ranged from 1 to 1,782; no confirmed cases have been reported from the Territories. Ontario continues to account for the majority of the cases reported in Canada: 99% or 16.3/100,000 population. No death linked to measles has been reported.

In Ontario, measles activity has been wide spread: 29 of the 42 health units have reported cases ranging from 1 to 432, with Peel, the largest health region in the province — population approximately 788,000 — reporting the highest number. Peel has been experiencing measles transmission since mid-January. Four health regions (Peel, Sudbury, Hamilton and Haldimand) have accounted for 72% of the cases, with the highest rate (186/100,000) being reported from Sudbury (population 209,000).

Confirmation Status

Of the 1,795 cases reviewed, 921 (51%) were laboratory-confirmed and 425 of these were identified as "positive for IgM". Of the remaining 874 cases that were clinically diagnosed, 476 were reported as epidemiologically linked to laboratory-confirmed cases.

Age Distribution

Cases were distributed in all age groups (Figure 2) and their ages ranged from 0.06 to 66 years; the median and mean ages were 10 and 9.9 years, respectively. Children 10 years of age accounted for the highest proportion (10%) of cases, followed by 9-year-olds (8%). Forty-nine cases were infants < 1 year of age. The highest proportion of cases occurred in those 10 to 14 years of age (35%), followed by 5 to 9 (31%) and 15 to 19-year-olds (19%). Seven cases involved individuals > 38 years of age (born before 1957).

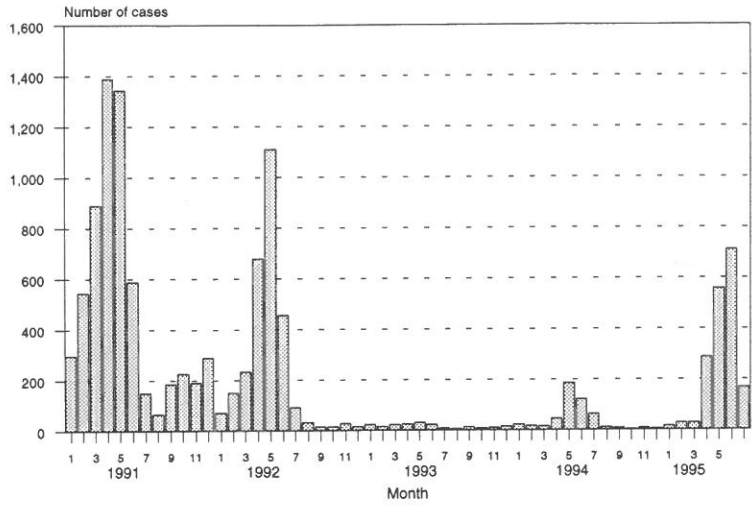
Vaccination Status and Preventability

At least 90% of the 1,687 cases reviewed regarding their vaccination status had a documented history of measles vaccination with one dose; over 92% of these cases had received the vaccine between 1980 and 1994.

The vaccine refusal group was small. The reported reason for "no vaccination" in those eligible by age included "personal exemption" (11 cases) and medical contraindication (2).

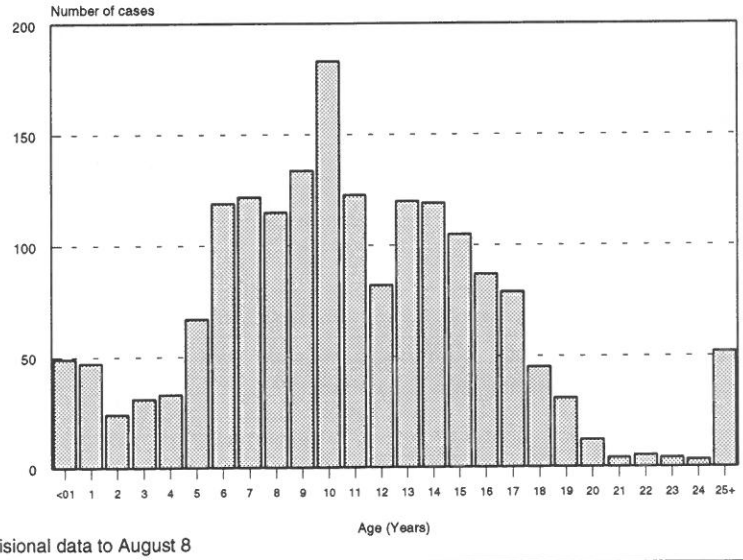
Based on age only, 56 (3%) cases were not eligible for vaccination because they were either born before 1957 (7 cases) or were < 12 months of age (49 infants). However, three of the infants had a history of vaccination. Immunization status was "unknown" or "unavailable" for 67 (4%) cases.

Figure 1
Reported cases of measles by month, Canada 1991-1995*



*Provisional data to August 8

Figure 2
Age distribution of measles cases in Canada, 1995*



*Provisional data to August 8

Comments

Reported measles activity in Canada in recent months suggests that circulation of the virus is limited to Ontario, with fairly extensive spread within the province.

Over 85% of the cases have occurred among school-aged children (5 to 19 years). It is also notable that, compared to the first four months of this year, the median age has shifted from 13 to 10 years of age.

Data pertaining to immunization history strongly suggest that since over 95% of the cases reported to date were not preventable by the currently practiced one-dose measles strategy, a two-dose strategy with a "catch-up" immunization policy is necessary for measles control and elimination in Canada.

Although the overall incidence is very low compared to the pre-vaccine era, the international data (provisional) for 1995 reported by the Pan American Health Organization (PAHO) highlights that Canada has the highest rate of measles in the Americas (North, South and Central). In other words, Canada, which represents < 4% of the total population of the Americas, has accounted for over 78% of the reported cases. PAHO's goal

for measles elimination is targeted for the year 2000, while Canada's goal is set for 2005.

A two-dose strategy was recommended by the National Advisory Committee on Immunization for measles elimination, although, due to other public health program priorities, none of the provinces has yet implemented this schedule. A two-dose policy has just been approved by the Quebec Ministry of Health.

Acknowledgement

The assistance and co-operation of all provincial and territorial epidemiologists, medical officers of health and other health care personnel, and staff from LCDC, is greatly appreciated.

International Notes

MEASLES — UNITED STATES, 1994

Morbidity and Mortality Weekly Report, Vol 44, No 26, 1995

As of June 13, 1995, local and state health departments in 39 states had reported 958 measles cases to CDC for 1994. This represents the second lowest number of cases ever reported, after the historic low of 312 cases in 1993[1]. In addition, 303 cases were reported for the U.S. territory of Guam (228) and the commonwealths of the Northern Mariana Islands (29) and Puerto Rico (46). This report summarizes the epidemiologic characteristics of measles cases and outbreaks reported in the United States during 1994.

Age distribution, complications, and hospitalizations. Of the 954 measles patients for whom age was known, 247 (26%) were aged < 5 years, including 73 (8%) who were aged < 12 months and 69 (7%) who were aged 12 to 15 months. Nearly one half (475) of all measles patients were aged 5 to 19 years, and 232 (24%) were aged ≥ 20 years. Among the 537 measles patients for whom information was available, 45 (8%) were reported to have been hospitalized; the median duration of hospitalization was 4 days (range: 1 to 22 days). Among 338 (35%) measles cases for which information on laboratory testing was provided, 229 (68%) were serologically confirmed.

Vaccination status. Vaccination status was reported for 848 (89%) measles patients. Among 762 vaccine-eligible persons*, 171 (22%) were reported to have documented receipt of at least one dose of measles-containing vaccine, and 539 (71%) were unvaccinated. Fifty-two (7%) persons with reported unknown vaccination status were considered to be unvaccinated. Four cases occurred among persons with documentation of two appropriately spaced doses of measles vaccine > 14 days before onset of symptoms. Among 301 unvaccinated measles patients who were eligible for vaccination and for whom a reason for nonvaccination was reported, 294 (98%) cited a religious (154 [51%]) or philosophic (140 [47%]) exemption to vaccination. Almost all (92% [277]) of these cases occurred in outbreaks in Illinois, Missouri[2], Nevada, and Utah. Cases among persons claiming religious or philosophic exemption to vaccination accounted for 36% of all reported cases in 1994.

Case classification. Among 949 reported cases for which the epidemiologic classification is known, 874 (92%) were indigenous to the United States, including 719 (76%) acquired in the state reporting the case and 155 (16%) resulting from spread from known importation from another state. International importations and cases occurring within two generations of these importations accounted for 75 (8%) measles cases in 1994. These cases were reported from 24 states and, for those for whom the country of origin was reported, occurred most frequently among persons arriving from Europe (26 cases) and East Asia (18). Cases resulted from importations from the Americas (eight), the Middle East (six), and Africa (two). Among the 75 persons with internationally imported measles, 23 (31%) were aged < 5 years; 32 (43%), 5 to 19 years; and 20 (27%), ≥ 20 years.

Outbreaks. Twenty-two outbreaks (clusters of five or more epidemiologically linked cases) were reported by 15 states during 1994 and accounted for 74% (705) of all reported cases. Two of these outbreaks began in 1994 and continued into 1995 (only cases that occurred during 1994 are reported here). Eight outbreaks, which included 12 to 156 cases, occurred in schools (six outbreaks) or colleges (two), five outbreaks (range: five to 22 cases) involved predominantly preschool-aged children, and nine (range: six to 134 cases) occurred in other settings and primarily involved young adults. The largest college outbreak (94 cases) resulted from spread from an importation, and two other outbreaks followed known importations. A total of 176 cases (18% of all reported cases) were related to international importations in 1994.

A single chain of transmission that was first recognized in a Colorado ski resort[3] extended into nine additional states and resulted in the largest outbreak of 1994 (247 cases); this outbreak involved students who were unvaccinated because of religious exemptions and who attended a college in Illinois or a school in Missouri[2]. Two other outbreaks involving persons with philosophic exemption to vaccination occurred in Salt Lake City, Utah (134 cases), and White Pine County, Nevada (12 cases). In outbreaks among persons with religious or philosophic exemption to vaccination, school-aged children accounted for

* Persons aged ≥ 12 months who were born after 1957. Persons born in or before 1957 are considered to be immune based on the likelihood of their having had measles before licensure of measles vaccine in 1963.

73% of all cases, and represented 56% of all measles cases among 5 to 19-year-olds in 1994.

Intensive surveillance and case investigation resulted in identification of three large multistate outbreaks during 1994. Epidemiologic linkages were established among 247 cases in 10 states from the outbreak that began in Colorado, among 57 cases in six states resulting from exposures in Las Vegas, and among 146 cases from an outbreak that began in Utah and spread to Nevada.

The genomic sequences of viruses isolated from the outbreak in Illinois and Missouri was similar to that of a virus isolated from an earlier outbreak in Memphis, Tennessee. These viruses probably were recently imported into the United States because they were closely related to measles virus strains that had previously circulated in Europe. Four distinct genotypes were identified by genomic sequencing among 10 isolates from four outbreaks and three single measles cases in the United States in 1994. None of these was related to the genotype circulating during the resurgence of 1989-1991, suggesting that all of these viruses were introduced into the United States as a result of importation.

MMWR Editorial Note: Although measles incidence has increased since the historic low reported in 1993, the number of cases reported during 1994 is the second fewest in the United States since measles reporting began in 1912. Important characteristics of current epidemiologic trends are the shift in age distribution of cases to older persons, the large proportion of cases in groups whose members do not routinely accept vaccination, and the increasing numbers of cases linked to international importations.

Since the measles resurgence of 1989-1991, increasing proportions of cases have occurred among school-aged children and adults, and proportionately fewer in preschool-aged children — a substantial change from 1989-1991, when incidence was highest among preschool-aged children, of whom as many as 80% were unvaccinated[4,5]. The shift in age distribution probably resulted from record-high measles vaccination coverage levels among preschool-aged children, which reached 90% in the first quarter of 1994[6]. More than half of the cases in persons aged 5 to 19 years were associated with outbreaks among persons with a religious or philosophic exemption to vaccination. Additional efforts will be necessary to reduce transmission among persons with objections to vaccination.

Laboratory and epidemiologic data suggest that measles transmission was interrupted in the United States during late 1993[7]. Because of the effective implementation of a strategy of mass vaccination of children in all countries in Central and South America, importations from the Americas have decreased substantially since 1991 and now represent a small percentage of all importations. However, the continued risk for international importations and spread from importations from other locations represent a challenge to the goal of measles elimination in the United States; known international importations or spread from international importations accounted for almost one fifth of reported measles cases in 1994.

The strategy for achieving the Childhood Immunization Initiative goal of eliminating indigenous measles transmission in the United States[8] is based on four components: 1) maintaining high coverage with a single dose of measles-mumps-rubella vaccine (MMR) among preschool-aged children, 2) achieving coverage with two doses of MMR for all school and college attendees, 3) enhancing surveillance and outbreak response, and 4) increasing efforts to develop and implement strategies for global measles elimination. CDC will continue to work with state and local health departments to implement recommendations to achieve high levels of population immunity, rapidly report and investigate all suspected measles cases, and enhance surveillance to facilitate rapid identification and confirmation of cases and implementation of appropriate control measures.

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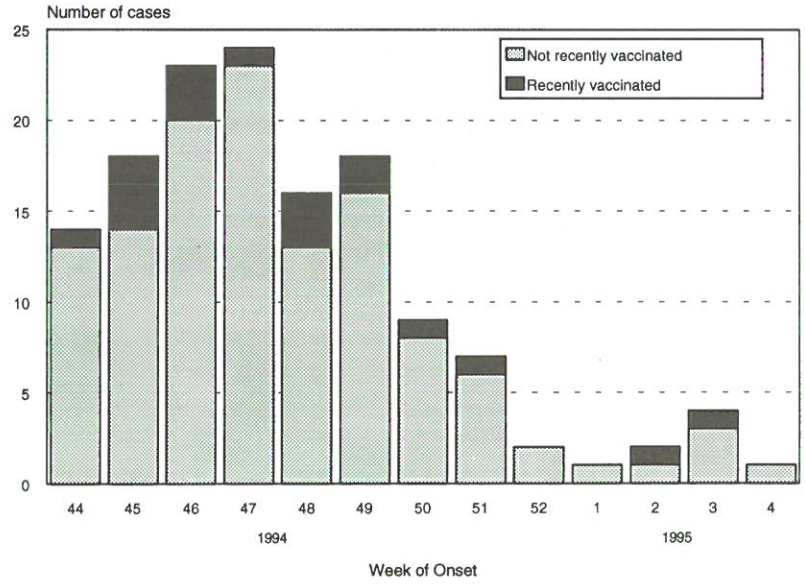
SURVEILLANCE OF MEASLES SINCE THE VACCINATION CAMPAIGN — UNITED KINGDOM

Communicable Disease Report, Vol 5, No 8 , 1995

Eight million children aged 5 to 16 years were offered measles and rubella vaccine during the national campaign in November 1994[1]. Coverage for the November phase of the campaign was 90% or higher in 82 of 110 district health authorities (75%) that supplied provisional reports at the end of December 1994. The PHLS Communicable Disease Surveillance Centre (CDSC) and the Virus Reference Division (VRD) at the Central Public Health Laboratory have offered a service to test for measles IgM in saliva from all cases of measles notified to the Office of Population Censuses and Surveys (OPCS) since the campaign began. The proportion of notified cases that have been confirmed by this salivary test is low and has fallen since the start of the campaign. A total of 3,718 cases of measles in England and Wales were notified to OPCS between week 94/44 (week ending November 4) and week 95/04 (week ending January 27). Samples of saliva for testing have been received from 1,901 of these cases (51%), and 142 of these samples (7.5%) were positive for measles IgM. Eighteen of the positive samples came from children who became ill less than six weeks after vaccination. In the first four weeks of January, 12 (2.8%) of samples were positive, compared with 66 (9.5%) in the first four weeks of the campaign.

Figure 1
Cases of measles confirmed by salivary testing, by week of onset†



† Excludes cases notified from week 94/44 onwards but with dates of onset before then.

Only six cases of measles with onset dates in 1995 and without a history of recent vaccination have been confirmed (Figure 1). Five were in children who were too young to be vaccinated, and one was in a schoolchild whose parents had refused consent. Of the 117 confirmed cases with onset during 1994 and without a recent history of vaccination, 64 (55%) were in children eligible for vaccination in the campaign.

These results suggest that the transmission of measles should (as predicted) be interrupted during early 1995. Confirmed cases of measles with onset after February 1 warrant additional investigation and enhanced local surveillance to identify associated cases and unvaccinated groups of children. Sequencing of measles virus genome from these cases may be able to distinguish between strains of measles virus introduced from abroad and strains present in England and Wales before the campaign. CDSC and VRD thank consultants in communicable disease control and public health laboratories for following up cases (confirmed by salivary or other tests) with onset after February 1, 1995.

Suggested investigation of confirmed cases

1. Vaccination — confirm history (with dates) and exclude those who were vaccinated up to six weeks before onset.
2. Contact — with other cases or people with rash in household, nursery, school, or at work.
3. Travel — recent travel abroad (cases or contacts).
4. Further tests (cases) — ask for consent and, if given, collect serum (confirmation of measles IgM), and urine and EDTA blood samples (sequencing of measles virus genome).
5. Further tests (contacts) — saliva from symptomatic and asymptomatic household contacts (measles IgM).

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2nd National Canadian Conference on Immunization

8 - 11 December, 1996
Toronto, Ontario, Canada

The Laboratory Centre for Disease Control has begun the planning and organizing of its 2nd National Canadian Conference on Immunization. The last conference, *Immunization in the 90s: Challenges and Solutions*, was held in Quebec City, October 5-7, 1994. The 2nd Conference will be increased to four days and will be held at the Royal York Hotel in Toronto. Current plans include an expanded exhibition area and additional time for peer-reviewed oral and poster presentations. Requests for further information, or to be placed on the conference information mailing list, should be faxed to **Mr. Chuck Schouwerwou, Conference and Committee Coordinator, at (613) 998-6413, or submitted in writing to the Childhood Immunization Division, Laboratory Centre for Disease Control, P.L. # 0603E1, Tunney's Pasture, Ottawa, Ontario, K1A 0L2.**

Submissions of pertinent reports/epi notes are welcome and success of this endeavour depends upon the readers' interest and cooperation. Priority for inclusion in the newsletter is determined by the article's relevancy. This is not a formal publication, and the views and interpretation may not necessarily reflect Health Canada's position. Distribution is free of charge. Anyone wishing to receive a copy on a regular basis should contact the Childhood Immunization Division, Bureau of Communicable Disease Epidemiology, LCDC, Ottawa, Ontario, K1A 0L2; telephone (613) 957-1340; Fax (613) 998-6413.

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