MEASLES *update*

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The introduction of this publication fulfils one of the recommendations made at the national Consensus Conference on Measles, which took place in December 1992 in Ottawa. Elimination of indigenous measles in Canada has been set for the year 2005. One major strategy toward achieving this goal is continual feedback of surveillance data and the sharing of information with those in the field.

As you know, despite measles control efforts, cases of measles continue to occur in many parts of the country at irregular intervals, and sometimes in epidemic proportions. Since the late 1960s, provincial immunization programs have been successful in reducing the incidence of disease by over 95%, but morbidity and mortality continue to occur.

The Childhood Immunization Division (CID), Bureau of Communicable Disease Epidemiology, Laboratory Centre for Disease Control (LCDC), in collaboration with the Health Promotion Directorate, Health Canada, would like to keep you informed, on a regular and timely basis, about the recent developments concerning measles in Canada. We hope this can be achieved by this newsletter "Measles Update", which is expected to be published quarterly.

It will inform Canadian public health personnel about epidemiologic features of measles, vaccine coverage, schedules, laboratory investigations, and recent national and global developments in preventative strategies. Announcements on upcoming meetings (national and international) pertaining to measles will be included.

This first issue is devoted to the proceedings of the national Consensus Conference on Measles, mentioned above, which were also published in the ***Canada Communicable Disease Report*** (CCDR 1993;19:72-9).

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. Publication in this newsletter does not preclude publication elsewhere, including the CCDR. 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. The contents of the newsletter may also be copied and distributed to other interested persons or groups.

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LCDC

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6th International Congress for Infectious Diseases, Prague, Czech Republic, April 26 – 30, 1994

Health Canada Santé Canada

Canada

CONSENSUS CONFERENCE ON MEASLES

PREAMBLE

Measles still ranks as one of the leading causes of childhood mortality in the world. The World Health Organization (WHO) estimates that approximately 1.4 million children die of measles every year. The World Health Assembly and the World Summit for Children have established global goals to reduce measles deaths and cases by 95% and 90%, respectively, from preimmunization levels by 1995.

The average annual measles incidence in Canada has fallen from 358/100,000 in a prevaccine period (1949 - 1958) to 18/100,000 in a post-vaccine period (1982 - 1991), representing a 95% reduction in the incidence of the disease. However, outbreaks of measles and thousands of cases still occur in Canada and it should no longer be acceptable to allow the disease to continue to affect our population so extensively.

WHO believes that interruption of wild virus transmission is possible, and many countries in the Americas (including the United States) have accepted the goal of measles elimination. One key factor to elimination is the selection of appropriate national immunization strategies, whether they be catch-up vaccination, routine vaccination and/or targeted immunization programs. Another key factor is an effective surveillance system. Failure to control and eliminate measles is not a failure of the vaccine, but rather a failure to do well that which we already know how to do.

Most countries do have national goals for vaccine-preventable diseases to guide their strategies. Currently, in Canada, there exist no national goals for measles that could guide future control efforts.

Introduction

In September 1990, the leaders of 71 countries, including Canada, gathered at the United Nations for the world summit for children. World leaders committed their governments to act on behalf of children and signed a declaration establishing a number of child health goals with respect to disease eradication or reduction, and immunization coverage. This resulted in Health Canada's commitment to support the development of national child health goals through the Children At Risk Initiative Program.

At a meeting of the Subcommittee on Communicable Diseases of the Advisory Committee on Epidemiology (ACE), it was recommended that a consensus meeting be held in order to develop national goals and resolve the many unanswered questions surrounding measles in Canada. To support this ACE recommendation and the Department's Commitment to the Children at Risk Initiative Program, the Laboratory Centre for Disease Control (LCDC), Health Canada, sponsored a Consensus Conference on Measles, 1-2 December, 1992.

Participants at the conference included representatives from all the provinces/territories; the Medical Services Branch, the Bureau of Biologics and the LCDC, Health Canada; the vaccine manufacturers; the Canadian Paediatric Society; the College of Family Physicians; the Canadian Medical Association; the Canadian Nurses Association; the Canadian Public Health Association; the Pan American Health Organization; and experts from the U.S. Centers for Disease Control, and universities and public health units across Canada. Many of the participants were members of the National Advisory Committee on Immunization and ACE.

The objective of the conference was two-fold:

(1) to develop national goals;

(2) to discuss and determine the best strategy for achieving these goals around four themes: outbreak control, cost, surveillance/epidemiology, and vaccine-related issues.

Presentations essential to the deliberations were made by participants during plenary and working group sessions. Agreement on the goal, targets and recommendations was reached by consensus. Appendix 1 contains a list of published articles used during this conference.

Many of the recommendations made at this conference will have impact on other diseases.

These conference proceedings consist of the following:

A. Goal
B. Targets
C. Consensus Statements and Recommendations:
   1. Routine Immunization
   2. Outbreak Control
   3. Epidemiology and Surveillance:
      (i) Case Definitions
      (ii) Laboratory Concerns
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Goal

Elimination of indigenous measles in Canada should be achieved by the year 2005.

Targets

The following coverage and incidence targets were recommended:

- Achieve and maintain 97% coverage with first vaccine dose at 2 years of age by the year 1997.
- Achieve and maintain 99% vaccine coverage for the second dose before school entry by the year 2000.
- Achieve and maintain an incidence of less than 1/100,000 by the year 2000 in each province/territory.

Consensus Statements and Recommendations

Routine Immunization

Following plenary discussion, a large majority of participants were in favour of a 2-dose routine schedule with measles-mumps- rubella (MMR) vaccine.

No compelling evidence exists for changing the age at vaccination from 12 months. The lesser protection at 12 to 14 months compared with ≥15 months documented in previous outbreaks is likely to be offset by a progressive decrease in measles antibody levels among women of childbearing age. Moreover, the actual percentage of infants immunized precisely after the first birthday is small. Studies of current seroconversion rates at 12 months of age in Canadian populations are needed. The age at first immunization is less critical in a 2-dose program. A report was presented on the measles outbreak in Perth County which occurred despite near-perfect application of NACI guidelines (immunization rates >99% in school children since mid - 1980s). It is apparent that the 1-dose MMR schedule with 99+% coverage will reduce the occurrence of measles to school-related outbreaks, occurring every 8 to 12 years, with an attack rate of 1% to 5%, as long as there is a possibility of introducing measles into the population. **The first priority in a 2-dose strategy remains the full application of dose one**. Recommendation for a second dose cannot be rationalized until nearly 100% of the target population receives a first dose.

Based on information from the CDC, it seems that a second dose could be given as soon as 3 months after the first, with response rates similar to those obtained if it were given much later. In Canada, the option exists to give the second dose as early as 18 months or at some time between 18 months and school entry. The second dose should be MMR vaccine because different population subsets are seronegative for rubella and mumps after one dose. Discussion on the specifics of implementing a routine 2-dose schedule and timing of doses was left to NACI.

Participants commented that there appears to be a psychologic barrier to the use of a 2-dose schedule for measles when actually most other routinely administered vaccines have multiple doses.

The level of control achievable with a 2-dose schedule is not known. Recent U.S. studies indicate that over 99% of individuals vaccinated with 2 doses will be seropositive. Additional studies on the 2-dose schedule are currently underway in the U.S.

Recommendations

- The highest priority should be placed on achieving and maintaining the 1-dose coverage.
- The age at first dose should remain as is currently recommended, i.e., as soon as possible after the first birthday.
- A routine 2-dose schedule should be implemented.
- The second dose should be given before school entry.

Outbreak Control

It was noted that current guidelines for selective revaccination are not implemented in most jurisdictions; furthermore, selective revaccination of the pre-1980 group may not have significant impact on interrupting outbreaks. This outbreak control measure in the current ACE recommendations is aggressive and may not be very effective. The ACE control measures in general, however, do have some effect on reducing the size and duration of outbreaks but are very expensive and disruptive.

Recommendations

- In closed populations, such as in schools, appropriate reporting, investigation, and management of cases and contacts should be completed within 10 days of rash onset in the index case for 80% of index cases by 1995, and 100% by 1997.
- By 1997, there should be no preventable cases beyond the second generation of cases.
- There should be active follow-up of school absentees in the 2 weeks prior to onset of rash in index cases because often it is the second generation of cases that is reported.
- With a 1-dose routine immunization schedule, in outbreak situations only those not yet vaccinated or those vaccinated before 12 months of age should be vaccinated; susceptibles should be excluded from school.
- When a 2-dose routine immunization schedule is implemented in outbreaks, all those contacts who received only one dose of measles vaccine should be revaccinated.
- In certain outbreaks, there may be a need for alternative strategies as highlighted by experience in the Northwest Territories.
- Existing control strategies should include implementation considerations, such as timing of revaccination clinics, priority setting depending on specific circumstances, e.g. delays in notification, existing single dose coverage levels, and age group affected.

Epidemiology and Surveillance

The surveillance of diseases in general, and measles in particular, allows for the assessment of the number of cases, rates and trends, vaccine effectiveness, outbreak identification and control, program and budget planning, identification of risk factors, education and information, and program evaluation.

Case Definitions

Confirmed case: Confirmation is virtually never done by virus identification but usually by enzyme-linked immunosorbent assay (ELISA) with the presence of IgM or a 4-fold increase between acute and convalescent IgG titre.

Clinical case: This is fairly specific. The problem is that clinicians see children on the first day of the rash whereas the clinical case definition requires a rash of 3 days' duration; therefore, this definition is not a practical one for action.

Recommendation

- A more sensitive "suspect case" definition should be developed. This could be done by modifying the current clinical case definition to require only one day of rash and one or more of the following: conjunctivitis, cough, coryza and Koplik's spots. The physician should discuss the case with the local medical officer of health who will decide if control measures are warranted.

Laboratory Concerns

A 4-fold rise in antibody determined by the ELISA is within the margin of error for the test. However, an 8-fold rise is too strict for a laboratory definition of measles.

Recommendations

- A rapid field identification kit for measles IgM, similar to other test kits available, should be developed.
- At present neutralization tests should be considered as the gold standards for indication of protection because they measure functional antibodies.
- By 1997 100% of sporadic cases should be laboratory confirmed.
- Provincial laboratories should provide measles antigen identification by Polymerase Chain Reaction (PCR).
- Laboratory protocols for testing, especially for Plaque Neutralization Tests, should be standardized throughout the country.
- Measles viral identification proficiency programs should be established for laboratories.

Disease Surveillance

The current system is passive, and most cases are reported in aggregate form at the national level. As the number of cases decreases, there is increased need to have case-by-case information to identify risk factors. Missed groups and missed opportunities for the identification of cases and the identification of vaccine status were discussed, e.g. school absentees, hospital cases and physician-identified measles that remain unreported.

Recommendations

- Active surveillance will only be needed when we are closer to the elimination objectives, e.g. when incidence target is achieved (active surveillance should then include physicians, hospitals, and schools).
- Consistent case surveillance and case definitions must be adopted in all jurisdictions.
- The Paediatric Hospital Surveillance System - IMPACT - currently searches for severe vaccine adverse reactions, but could be expanded for surveillance of measles.
- Every item that is reported should be justified. Mandatory information for measles surveillance should be prioritized and incorporated into all provincial surveillance systems for inter-provincial comparison purposes.
- Surveillance information must be reported back to those in the field to encourage further reporting.
- Outbreaks of measles should be reported to LCDC.

Assessment and Evaluation of Vaccine Programs

Recommendations

- The timing and method of assessment of vaccine coverage by certain ages should be standardized, i.e., first dose coverage should be assessed at 24 months by all provinces so that data are comparable. The actual method to collect the data may have to be determined locally.
- A yearly assessment of vaccine coverage for both doses should be carried out in all jurisdictions.
- Serosurveys should remain a low priority until coverage and case rates can be correctly measured.
- It will be necessary to identify and pro-actively target groups and areas with low vaccine coverage to achieve the goal of measles elimination.

Immunization Records

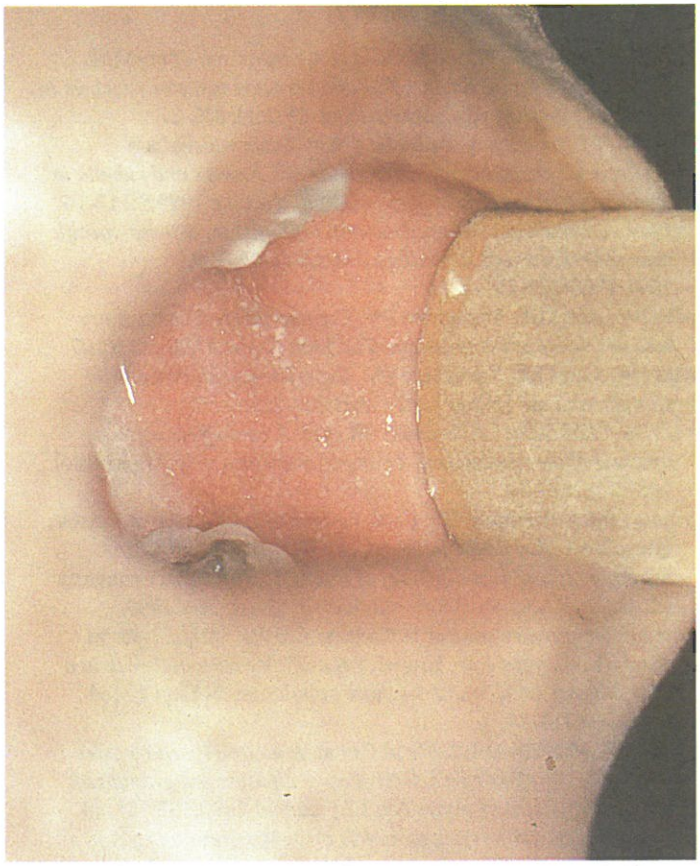
Recommendations

- Provinces should move toward a province-wide individual client immunization record system that includes all vaccines, all antigen combinations, and all ages.
- The long-term goal whereby immunization records are linked to unique health-care card numbers should be adopted in each province.
- In between outbreaks, immunization records should be properly maintained in the public health units. Health department staff should verify that all children exempted from measles vaccination because of a past history of measles have a record of physician-documented measles according to the case definition or laboratory confirmation.

- Provinces should ensure that all children in day-care centres, nurseries and schools have age-appropriate proof of measles immunization. Mechanisms for achieving goals should be appropriate for local conditions and should include legislation and enforcement where necessary. Compliance with this goal should be monitored annually.

Communication and Education Issues

As control of measles increases and elimination is approached, continual feedback of surveillance data to those in the field will allow them to intensify their efforts to identify and subsequently reduce the remaining number of cases.



Recommendations

- Visual material to assist in the identification of cases, e.g. appearance of rash, should be developed and distributed.
- The importance of vaccination and the responsibility of parents for vaccination of their children and for maintaining correct immunization records must be reinforced.
- A means should be explored to facilitate the exchange of information on how to reduce measles incidence in hard-to-reach populations or populations resistant to immunization.
- A measles newsletter should be introduced to share otherwise unpublished information among those directly involved with the elimination of the disease.
- Physicians should be better informed about IgM detection for measles confirmation.

Research

Recommendations

- The usefulness and impact of a "suspect case" definition on measles transmission should be assessed.
- The following laboratory tests should be developed and implemented:
  1) a rapid test for diagnosis of acute measles; 2) a rapid technique to detect measles immunity; 3) a standardized PCR method for measles identification.
- The usefulness of sentinel physicians or other case-finding surveillance mechanisms should be evaluated.
- Missed opportunities for vaccination should be assessed.
- Antibody levels determined by ELISA should be compared to actual protective levels.
- A strategy to increase parental awareness regarding the importance of vaccination and their responsibility for it must be developed and implemented.
- The feasibility of immunization records being linked to unique health-care card numbers for measles and other vaccinations should be assessed.

Role of LCDC

Recommendations

- LCDC should have an active role in developing standardized research questions and protocols and methodologic

instruments to use locally for field investigations. LCDC should provide resources locally.

- LCDC should be instrumental in developing a system for immunization record maintenance and communicable disease surveillance, but this has a lower priority.
- LCDC should conduct serosurveys and assess illness burden due to complications and death.
- LCDC should provide expert advice and services, e.g. program evaluation, vaccine storage and handling guidelines, and institute a review process of such services.

Cost Issues

There was much discussion on the issue of cost and funding needed to support various goals and strategies and on trying to decide if funding should follow goals or if goals should be adjusted to the existing level of funding. By setting goals, we would be able to secure funding. Moreover, it should not be assumed that strengthening one immunization program for a specific disease will inevitably result in decreased funding for other such programs. Therefore, it was concluded that there was a need for a similar comprehensive approach for *all* vaccine-preventable diseases.

Several cost:benefit studies have been carried out and all have found that measles vaccination is highly cost-effective and even cost-saving. It was recognized that accurate costing of various strategies was very difficult and that data were missing to be able to determine the cost of strategies during the conference. Also, it is very difficult to separate the cost:benefit implications of measles immunization strategies from those for rubella and mumps since a trivalent vaccine is used.

- ***Change age at immunization*:** Although changing the age of immunization from 12 to 15 months was not recommended for measles elimination, such a strategy would reduce the pool of susceptibles by 50% (based on Quebec data) and cost little. It would be possible to raise the age of immunization to 15 months with a caveat to return to 12 depending on outbreak situations and maternal immunization.
- ***School entry legislation:*** It has few cost implications. In some jurisdictions, it may raise compliance with immunization and make it easier to manage outbreaks. However, legislation is difficult to change and there is a risk of backlash against state involvement in issues perceived by some to be private. School entry catch-up *is* possible without legislation.
- ***Computerized immunization records:*** One has to look at the benefits of such a system in a broad sense. It would allow for assessment of vaccine coverage, would supp'ort outbreak control and help reduce vaccine waste. These issues extend beyond measles. Initial starting costs are high and there is a requirement for sufficient hardware. However, many provinces are currently developing such systems. The federal government should specify data standards. Confidentiality issues are important and may require legislation. There was strong support for good computerized records.
- ***Two-dose routine immunization:*** The cumulative efficacy of such a program would be in excess of 99%. To minimize the additional costs of a 2-dose schedule, efficient procedures, such as administration of the vaccine at the same time as other routinely administered vaccines, should be considered. There is some concern that the marginal cost-effectiveness ratio of a second dose is extremely high. The fear was expressed that the cost would be detrimental to other public health programs.
- ***Outbreak control limited to exclusion of susceptibles:*** This would be much cheaper and may be just as effective as any of the current outbreak control strategies.

Appendix 1: Bibliography

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