Health Canada Santé Canada

Update: Vaccine-Preventable Diseases

Volume 6 Number 2 April 1998

Table of Contents

Current News

Measles Surveillance: Guidelines for Laboratory Support – Summary

Working Group on Measles Elimination in Canada

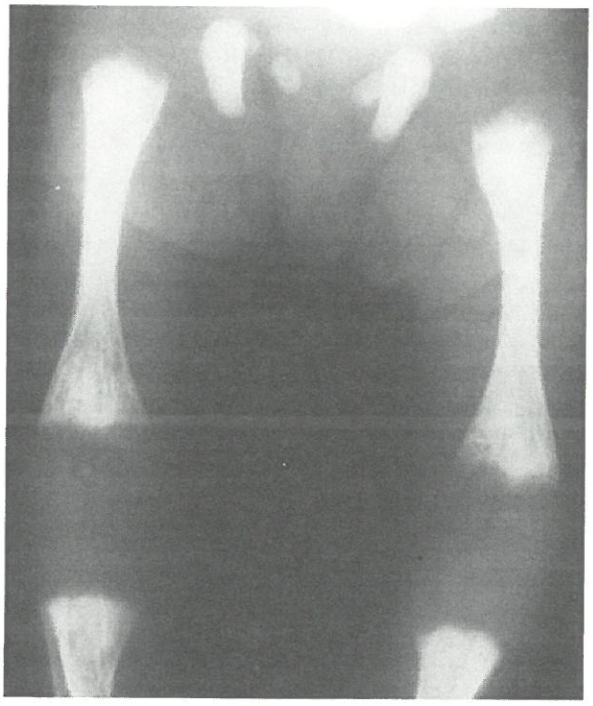
Following the commitment by all provinces and territories to eliminate measles in Canada by the year 2005, a two-dose measles vaccine schedule has been adopted across the country augmented by mass vaccination "catch-up" programs in almost all jurisdictions. As the number of cases of measles declines, the importance of surveillance will become even greater than at present. It will be more and more crucial that all suspected cases of measles be reported and samples from all sporadic cases be submitted for full laboratory investigation.

To oversee and document the process of measles elimination, the Laboratory Centre for Disease Control (LCDC) has convened the Working Group on Measles Elimination in Canada (WGMEC). This group will review efforts for the elimination of measles across the country, monitor case incidence and make recommendations about national surveillance.

The importance of a standard set of laboratory procedures to be used across the country is evident in any assessment of measles surveillance procedures. The WGMEC has therefore developed these guidelines to ensure optimum laboratory surveillance of measles at a time when, with fewer cases, false positive serological results will be more likely, and it will become increasingly important to detect any importation of virus into a community.

Effective laboratory support for surveillance requires that:

- health-care professionals are aware of the system and its requirements;
- appropriate specimens are collected and sent to a laboratory capable of performing the necessary tests;
- reliable equipment is used and tests performed correctly;
- timely feedback is provided to the appropriate authorities; and
- the integrity of the surveillance system is monitored on an ongoing basis.



X-ray of the lower limbs in a newborn with congenital rubella syndrome. The ends of the long bones are ragged and streaky in appearance (the so-called "celery stalk" metaphyseal changes), due to active rubella infection in the bone. Courtesy of Dr. Theresa Tam.

Canada

Both the public-health authority and the laboratory have a role in ensuring optimum laboratory surveillance of measles in a jurisdiction. The guidelines have been structured to reflect these roles. The role of public health is to educate health-care providers on the importance of laboratory testing and to make sure that the laboratory resources are accessible. The role of laboratories is to develop and maintain testing resources, standard procedures and quality assurance, and to analyse data and provide feedback of the results to public-health authorities. The following guidelines propose a standard set of responsibilities for adoption in each province or territory to facilitate effective laboratory support for the surveillance of measles.

The complete document of *Measles Surveillance: Guidelines for Laboratory Support* is available from LCDC and is also published in its entirety in the CCDR[1]. Please refer to the original document for specific procedural details concerning these guidelines.

The Public-Health Role

The provincial or territorial epidemiologist should ensure that the following policies and procedures are in place locally.

1. All suspected measles cases* are to be reported to the local public-health authority.
2. A full pediatric tube (3 mL) of blood should be collected for measles-specific IgM serological testing for all sporadic cases of measles and all outbreak cases with no link to a confirmed case*. The blood sample should be taken early in the illness, ideally between 3 and 7 days after onset of rash (at most 28 days after rash onset)[§].
3. In addition to the blood sample, a urine specimen and/or nasopharyngeal or throat swab should be obtained for virus isolation. The nasopharyngeal or throat swab should be obtained within 4 days of onset of the rash and immediately placed in viral transport medium. For urine specimens, approximately 50 mL of sterile urine should be obtained within 7 days of onset of the rash. The specimen should immediately be transported on ice (4° C) to the laboratory for proper processing.
4. Patient identifier information, specimen collection date, date of fever onset, date of rash onset, prior measles vaccination history, and whether the case meets clinical or suspect measles case definition should all be included when submitting specimens to the laboratory.
5. Procedures should be in place for transportation of specimens to the laboratory as well as notification of the local, provincial and territorial public health authorities of all positive measles and rubella results within 1 business day of the results becoming available.

The Laboratory's Role

The provincial or territorial laboratory must ensure the following regarding serologic testing.

1. All suspected measles cases are to be screened for measles-specific IgM preferably using a kit recommended by LCDC[§,‡]. Both false positive and false negative IgM serology results may occur with commercial test kits. Therefore, all positive sera and 5% to 10% of negative sera should be sent to LCDC for confirmatory testing using the CDC measles IgM-capture enzyme immunoassay, the reference "gold-standard".
2. All serum specimens submitted from suspected measles cases should also be screened for specific IgM antibodies against parvovirus B19 and rubella, constituting a "red rash screen".
3. Urine and nasopharyngeal swab specimens must be processed properly within 48 hours of specimen collection to increase the probability of successful measles virus isolation. Specimen processing involves centrifugation and subsequent resuspension in viral transport medium or cell culture medium. The sample is either immediately used for virus isolation or is frozen at -70° C.
4. For those laboratories that do not undertake virus isolation, LCDC can provide sample processing and virus isolation services.
5. All measles virus isolates should be shipped to LCDC for genotypic analysis.
6. Results of all laboratory tests should be reported to the physician and positive results for measles or rubella should be reported to the local public-health authority.
7. All laboratories providing measles diagnostic services should take part in the appropriate national proficiency testing program offered by LCDC.

Reference

1. Working Group on Measles Elimination in Canada. *Measles surveillance: guidelines for laboratory support.* CCDR 1998;24:33-44.

---

* Measles case definitions are as follows: (a) suspect case: fever ≥ 38.3° C, cough/coryza/conjunctivitis, and onset of generalized maculopapular rash, (b) clinical case: fever ≥ 38.3° C, cough/coryza/conjunctivitis, followed by generalized maculopapular rash for at least 3 days, and (c) confirmed case: a significant rise in serum antibody titre between acute and convalescent serum samples or the presence of measles-specific IgM in cases with compatible clinical or epidemiologic features; or clinical measles in a person who is a known contact of a laboratory-confirmed case; or detection of measles virus in appropriate specimens.

§ Demonstration of a significant increase in measles-specific IgG titre is also a reliable serologic method of analysis. The acute blood sample should be obtained no later than 7 days after the onset of the rash. The convalescent sample should be collected 10 to 20 days after the first sample. These paired sera must be tested simultaneously.

‡ Please contact the Viral Exanthema Laboratory at LCDC, or refer to the complete guidelines for measles-specific IgM enzyme immunoassay kit recommendations.

Do Vaccines Cause Chronic Illness?: Assessing and Responding to Unconfirmed Allegations

Robert Pless, Division of Immunization, Bureau of Infectious Diseases, LCDC, Ottawa

Several high profile vaccine safety concerns surfaced within the past year. The 1997 Canadian National Report on Immunization[1] reviewed four of them: the SV40 contamination of early polio vaccines; an alleged link between measles vaccination and Crohn's disease; the rubella vaccination and risk of chronic arthropathy; and hair loss reported after hepatitis B vaccines. Other diseases also being blamed on immunization include multiple sclerosis, chronic fatigue syndrome, autism and insulin dependent diabetes mellitus (IDDM). Although such allegations usually begin as the focus of weak but published epidemiologic research, they easily garner media attention. Compared to the focus on acute complications of vaccination that were the highlight of the 1980's[2] and early 1990's [such as neurologic complications and deaths blamed on the diphtheria-pertussis-tetanus (DPT) vaccine] concerns about the long-term effects of vaccines are now gathering more attention and are demanding a response from government regulators, public health authorities and health care providers. Why are such allegations being raised? How do we respond to them? These questions will be addressed in this article.

Assessing the Long-Term Safety of Vaccines

One of the challenges faced by the approvals process for any drug product is the need to address potential long-term adverse effects based on limited or non-existent long-term data. Critics of vaccination are turning to the notion that since these long-term studies have not been conducted, vaccines carry inherent serious risks and such risks may outweigh their benefits. They are demanding that long-term studies be done to "prove" the safety of routine vaccination, yet are vague or silent as to the hypothesized outcome of such studies, pointing only to ecological evidence to suggest that vaccines might be dangerous by "explaining" the increasing incidence of asthma, diabetes, Crohn's disease and cancer as caused by more widespread use of vaccines. Although it is true that long-term studies are rarely conducted or available prior to approval, a simplistic viewpoint that suggests vaccines should be avoided, ignores several concepts. First, we must ask what the purpose of such long-term studies might be. Is there a reason to suspect that components of the vaccine, or the vaccine itself might have long-term effects – in other words some biologic plausibility? If components are toxic, then those components should not be used. Substances are evaluated for toxicity using animal studies, and are designated on a scale of potential human toxicity or carcinogenicity. Does the disease for which a vaccine is contemplated have any long-term sequelae? If so, then could a vaccine (which is sometimes designed to mimic a mild form of the disease in order to produce an immune response) have similar effects? Second, are long-term clinical trials ethically feasible for a vaccine that has been shown effective in preventing disease in a population at risk. Finally, approved products are far from abandoned once on the market – there are postmarket surveillance initiatives in place around the world all concerned with the maintenance of vaccine safety. These systems, along with more targeted retrospective epidemiologic studies (even those which have raised the recent allegations), are continually vigilant for the harmful effects of vaccines. Any long-term effects should already be obvious by the time a vaccine has had sufficient impact on the incidence of a disease to raise serious questions challenging its high benefit to risk ratio. The studies raising allegations of long-term damage by vaccines have been conducted and published, yet are either weak epidemiologically or have been refuted by subsequent evidence or failed replication, which suggest that vaccination continues to maintain a safe track record while continuing to be (appropriately) questioned. Any data suggesting that vaccines may be responsible for chronic disease or long-term adverse events are taken seriously.

Diabetes and Immunization

This concern was initially raised several years ago by one researcher who linked the increasing incidence of diabetes to the widespread use of childhood vaccination. He subsequently conducted experiments on mice with a genetic predisposition to diabetes. When the rodents given an anthrax vaccine were compared to controls, the exposed group were significantly more likely to develop diabetes. More recently, ecologic data comparing IDDM rates and vaccination policies in various countries were cited as evidence supporting a link[3], with a further refinement that early vaccination (prior to 2 months of age) was protective against IDDM while immunization beginning after 2 months led to an increased incidence. Expert review of the evidence accepted some biologic plausibility to the hypothesis, the data presented remained inconclusive and other epidemiologic evidence refuted it[4], suggesting that further investigation was necessary. This hypothesis thus remains interesting but as yet unproved.

Measles-Mumps-Rubella Vaccine and Autism

An apparent link has been suggested between autism, diagnosed most often in the second year of life, and measles-mumps-rubella (MMR) vaccine administered ≥ 12 months of age. Some

claim that the incidence of autism is rising. Data in support of this concern have now allegedly emerged from a case series published by a research team in the United Kingdom (UK) with a widely known interest in measles-mumps-rubella (MMR) vaccine and inflammatory bowel disease[5]. In a series of patients referred to their clinic for chronic gastrointestinal illness and autistic features, parents self-reported an association between the receipt of the vaccine and the and subsequent diagnosis of autism. However, an editorial accompanying the publication[6] highlighted two serious pitfalls with the study: a confusion between temporal association and causation, and an obvious referral bias. It should not escape notice by readers of that paper that some 600,000 infants receive MMR vaccine each year in the UK and the study represented a series of 12 patients (3 to 12 years of age), who were referred to a group with international recognition for their efforts to raise doubts about the safety of measles vaccine, doubts that have not been confirmed and rather have been refuted by mounting evidence.

Conclusion

To claim that vaccines cause chronic illness requires carefully collected and interpreted evidence. It is a serious allegation and must not be made lightly, given the global importance of vaccination to the health of the world's children. Unfortunately, the fact that little or no evidence is needed by opponents to vaccination before allegations of "vaccine damage" are made and surface in the media, raising unjustified concerns, highlights the difficulty public health officials and vaccine providers face in responding to questions from patients or parents of patients who read about these concerns so presented. After decades of vaccine use in Canada and around the world, no reliable evidence is pointing to the notion that vaccines cause "epidemics" of chronic or long-term illness. The allegations that are surfacing have to date, shared a number of features: they are based on research studies that are flawed, have failed replication or are refuted by other evidence. Their publication in respected journals, though welcome in order to invite scrutiny and scientific debate, is not an indication of sound data and quality research. The two examples raised here, which were understandably picked up by the media, are prime examples of how readily weak data are embraced and disseminated.

Given the rapidity with which study results can disseminate once they are published – with press releases issued by the journal, advance notice given to selected groups and circulation of abstracts on a journal's Internet site – before the full text might arrive by mail or at the local health sciences library, it is vital to establish an approach to responding to vaccine safety concerns. Until more precise responses are forthcoming on a given topic, the following key messages may be helpful:

1. Vaccines have been in use for decades. They are carefully assessed for safety and efficacy before licensing and are monitored closely while in widespread use. Hundreds of millions of doses have been distributed over the years without any corresponding "epidemic" of chronic illness being noticed in any population.
2. Apparent increases in disease incidence may be due to normal secular trends for that disease, changes in case definitions, enhanced surveillance or improved diagnosis – all unrelated to external factors.
3. Long-term studies of vaccine safety are difficult to conduct for any group. Allegations based on a single study must be viewed with caution until properly assessed and in some cases replicated by others. Surveillance systems that operate from different angles are in place to monitor vaccine safety such as active and passive surveillance, record linkage study capabilities and formal epidemiologic investigations.
4. Differentiating temporal association from causation can be extremely difficult, but considering such a possibility is crucial.

References

1. National Report on Immunization, 1997. Paediatrics and Child Health 1997, March/April 1998;3(Suppl. B):1B-33B.
2. Coulter HL, Fisher BL. *DPT: A shot in the dark. The concerned parents' guide to the risks of diphtheria, pertussis (whooping cough) and tetanus vaccination*. New York, NY: Warner Books, 1986.
3. Classen DC, Classen JB. *The timing of pediatric immunization and the risk of insulin-dependent diabetes mellitus*. Infectious Diseases in Clinical Practice 1997;6:449-54.
4. Heijbel H, Chen RT, Dahlquist G. *Cumulative incidence of childhood-onset IDDM is unaffected by pertussis immunization*. Diabetes Care 1997;20:173-75.
5. Wakefield AJ, Murch SH, Anthony A et al. *Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children*. Lancet 1998;351:637-41.
6. Chen R, DeStephano F. *Vaccine adverse events: causal or coincidental?* Lancet 1998;351:611-12.

Influenza and Pneumococcal Vaccine Uptake Rates in Adults Living in Long-Term Care Facilities in British Columbia

Gordean Bjornson, David Scheifele, Giselle Lightle, Vaccine Evaluation Centre, British Columbia's Children's Hospital; Alison Bell, Epidemiology Division, British Columbia Centre for Disease Control, Vancouver, British Columbia
(Adapted from British Columbia Health and Disease Surveillance, Vol 6, No 11, 1997)

Introduction

Respiratory tract infections due to influenza virus and *Streptococcus pneumoniae* are common causes of morbidity and mortality in seniors, particularly those in long-term care facilities or those with chronic cardiac or lung problems. Between 70,000 and 75,000 hospitalizations and approximately 6,700 deaths are attributed to pneumonia and influenza each year in Canada[1].

The National Advisory Committee on Immunization (NACI) recommends that all residents of long-term care facilities, all persons > 65 years of age, and those with chronic health problems be vaccinated yearly with influenza vaccine and once with pneumococcal vaccine[2]. A Canada-wide survey of long-term care facilities found that, overall, 78.5% of residents were immunized with influenza vaccine and only 1% with pneumococcal vaccine[3]. Data for British Columbia (BC) indicated an uptake rate of about 77% for influenza vaccine in facilities with more than 25 residents in 1991. These are the only published data for BC relating to long-term care facilities. Duclos and Hatcher[4] used 1991 data to estimate that 43.9% of people > 65 years of age receive influenza vaccine in BC. They also estimated that the uptake rate among Canadians with chronic medical conditions for whom influenza vaccine is recommended is only in the range of 52% to 55%.

Data for pneumococcal vaccine uptake are scattered and incomplete. Uptake is limited primarily because most provinces in 1996 did not supply the vaccine routinely for those groups for whom it is recommended. Staff in two randomly selected Health Units in BC indicated that no pneumococcal vaccine was dispensed to long-term care facilities in their jurisdictions. Representatives from Merck Frosst Canada indicated that approximately 3,900 doses of pneumococcal vaccine are sold annually in the province.

The BC adult population ≥ 65 years of age in 1991 numbered 422,010[5]. Of those, approximately 7.2% (30,500) lived in intermediate or extended care facilities and an additional 50,000 (11.8%) lived in the community with support from continuing care[6].

The purpose of this study was to survey licensed adult care facilities in the province of BC to determine the uptake rate of influenza vaccine, and to inquire if pneumococcal vaccine was being used at all.

Methods

A questionnaire was mailed to all 494 licensed care facilities in the province. These were identified from records supplied by the Ministry of Health. After reviewing some of the initial questionnaires that were returned, it became apparent that many of these facilities were private homes taking care of one or two patients. In addition, several were actually long-term care wards in general community hospitals. Private homes with less than five patients were subsequently excluded and each hospital facility with two seperate licensed areas was considered to be one, leaving 367 facilities to be surveyed.

Facilities not returning their questionnaire within 3 weeks were mailed a second one. Those not responding to the second one were telephoned by the study coordinator to request the information.

The questionnaire for licensed facilities asked about the basic demographics of the facility as of December 31, 1996; influenza vaccination policy; percentage uptake of influenza vaccine among residents as of December 31, 1996; and pneumococcal vaccine policies. In addition, the questionnaire asked about staff immunization policies and the usage of influenza vaccine among staff. To ensure that the questionnaire was easy to complete, it was piloted in six different facilities and subsequently refined.

The primary outcome measures were the influenza vaccine uptake rates among residents and staff of each facility, for each health unit jurisdiction, and overall for the province. Comparisons were made based on size of facility and level of care. The effect of facility policies for influenza vaccine administration on uptake was also examined.

Results

Approximately 60% (220) of the questionnaires were returned after the first mailout. About 150 facilities were sent a second questionnaire. Only 22 of these were returned, yielding 242 completed questionnaires for analysis. This represents a 65.9% return rate from eligible facilities and a 72% rate from total licensed adult care beds in the province.

Ninety-nine percent of responding facilities have influenza vaccine programs, with the health unit as the primary source of the vaccine (92%). The overall influenza vaccine uptake among residents of responding facilities was 83% (Table 1). Only responding acute care hospitals had an uptake rate of < 80% for residents of their long-term care facilities (actual rate 61%). There was no relationship between the size of the facility and the uptake rate of influenza vaccine (Table 2). There was no trend between rural or urban location of facilities and low uptake of influenza vaccine.

In 84% of the responding facilities, family physicians order influenza vaccine on an individual basis (Table 3). There was no difference in uptake rates between facilities where vaccine is

Table 1
Influenza vaccine uptake based on category of care provided by responding facilities

Influenza vaccine uptake rate (%)	Extended Care (%)	Personal Care (%)	Intermediate Care (%)	Acute Hospital* (%)	Private Hospital (%)	Personal/ Intermediate Care (%)	Other§ (%)	**Total (%)**
≤ 25	1	0	5 (4.5)	1 (20.0)	0	0	1 (4.8)	**8 (3.3)**
26-50	3 (5.0)	0	0	0	0	0	2 (9.5)	**5 (2.1)**
51-75	9 (15.0)	2 (20.0)	20 (18.0)	2 (40.0)	3 (15.0)	5 (33.3)	2 (9.5)	**43 (17.8)**
76-90	11 (18.3)	4 (40.0)	43 (38.7)	2 (40.0)	3 (15.0)	4 (26.7)	4 (19.1)	**71 (29.3)**
> 90	30 (50.0)	4 (40.0)	39 (35.1)	0	13 (65.0)	5 (33.3)	11 (52.4)	**102 (42.2)**
No information provided	6 (10.0)	0	4 (3.6)	0	1 (5.0)	1 (6.7)	1 (4.8)	**13 (5.3)**
Total	**60 (100.0)**	**10 (100.0)**	**111 (100.0)**	**5 (100.0)**	**20 (100.0)**	**15 (100.0)**	**21 (100.0)**	**242 (100.0)**
Average uptake of influenza vaccine (%)	84	83	81	61	90	82	84	83

* With reference to affiliated long-term care facility.
§ Other categories of care as listed by the Ministry of Health.

Table 2
Influenza vaccine uptake rate versus number of beds in facility

Influenza vaccine uptake rate (%)	≤10 beds (%)	11-25 beds (%)	26-50 beds (%)	51-100 beds (%)	101-200 beds (%)	> 200 (%)	**Total (%)**
≤ 25	0	1 (3.6)	3 (6.1)	1 (1.1)	3 (6.3)	0	**8 (3.3)**
26-50	1 (14.3)	0	2 (4.1)	1 (1.1)	0	1 (5.3)	**5 (2.1)**
51-75	0	5 (17.9)	6 (12.2)	19 (20.9)	11 (22.9)	2 (10.5)	**43 (17.8)**
76-90	2 (28.6)	4 (14.3)	13 (26.5)	32 (35.1)	13 (27.1)	7 (36.8)	**71 (29.3)**
> 90	3 (42.9)	18 (64.3)	24 (49.0)	34 (37.4)	19 (39.6)	4 (21.1)	**102 (42.2)**
No information provided	1 (14.3)	0	1 (2.0)	4 (4.4)	2 (4.2)	5 (26.3)	**13 (5.3)**
Total	**7 (100.0)**	**28 (100.0)**	**49 (100.0)**	**91(100.0)**	**48 (100.0)**	**19 (100.0)**	**242 (100.0)**
Average uptake of influenza vaccine (%)	84	87	91	84	79	80	83

ordered by the family or the staff physician. After December 31, 1996, influenza vaccine was administered to newly admitted patients in 25% of the responding facilities. Pneumococcal vaccine was recommended upon admission in 12% of the responding facilities. Further details of vaccine uptake were not obtained.

Discussion

We found that virtually all responding facilities (99%) had programs to administer influenza vaccine to patients and managed to vaccinate most (83%) of them. With 66% of the facilities responding to the survey (and accounting for 72% of the beds), this is likely a good representation of what is actually happening in the community. The observed vaccine uptake rate of 83% is a slight improvement over the 77% rate found in a smaller study of similar patients in 1991[3]. We could find no predictor of low influenza vaccine uptake. The only facilities that had < 80% influenza vaccine uptake were those associated with acute care hospitals. Because the number (5) of acute care hospitals responding to the survey was limited, the reliability of this observation is unknown. However, if this was the true rate, then it may be beneficial to target long-term care patients of acute care facilities for special attention.

A concern is that only 25% of responding facilities had programs in place to administer influenza vaccine to new admissions after December 31, 1996. Since it was estimated[4] that < 50% of adults > 65 years of age receive influenza vaccine, these new admissions were potentially unprotected while being at increased risk of influenza. Immunization of susceptibles should continue until the end of seasonal influenza disease activity.

The fact that 84% of influenza vaccinations were ordered on an individual basis by family physicians appears to be inefficient and potentially costly to the health care system. It should be determined if standing orders would be more convenient, efficient, and timely.

Pneumococcal vaccination was recommended upon admission at 12% of the responding facilities. The survey did not attempt to gather information on the actual uptake rate of pneumococcal

Table 3
Category of care and relationship to ordering of influenza vaccine

Vaccine Ordering Policy	Extended Care	Personal Care	Intermediate Care	Acute Hospital	Private Hospital	Personal/ Intermediate Care	Other	**Total**
Vaccine for residents is ordered by:								
Each resident's family physician	51 (85)	7 (70)	94 (85)	4 (80)	18 (90)	12 (80)	17 (80)	**203 (84)**
Staff physician for all residents	9 (15)	1 (10)	13 (12)	0	1 (5)	2 (13)	2 (10)	**28 (12)**
Other	0	2 (20)	3 (3)	1 (20)	1 (5)	0	1 (5)	**8 (3)**
N/A	0	0	1 (1)	0	0	1 (7)	1 (5)	**3 (1)**
Is influenza vaccine administered to new admissions after December 31, 1996?								
Yes	16 (27)	4 (40)	24 (22)	0	10 (50)	4 (27)	2 (10)	**60 (25)**
No	41 (68)	5 (50)	86 (77)	5 (100)	10 (50)	10 (67)	15 (71)	**172 (71)**
N/A or no data	3 (5)	1 (10)	1 (1)	0	0	1 (7)	4 (19)	**10 (4)**
Total	**60 (100)**	**10 (100)**	**111 (100)**	**5 (100)**	**20 (100)**	**15 (100)**	**21 (100)**	**242 (100)**

N/A = not available.

vaccine. Since the vaccine was not provided free to adults > 65 years of age during the survey period, the uptake rate was likely very low. With the introduction in the fall of 1997, of the new provincial program in the fall of 1997 to provide pneumococcal vaccine at no cost to all adults living in residential care, the uptake should improve.

Potter et al[7] showed that influenza vaccination of health care workers decreases the mortality rate among seniors living in long-term care facilities. Our initial plan was to collect influenza vaccine uptake rates of staff working at the surveyed facilities. However, after discussions with a sample of facilities, we found that this was a very difficult task because many facilities are staffed with casual employees and tracking their immunizations is difficult. We did ask how many employees were immunized, but we were not provided with a denominator to calculate uptake rates. Facilities indicating that no staff were immunized represented 12% of the respondents. Facilities indicating ≤ 25 doses of vaccine were given to the staff constituted 69% of the respondents, even though only 35% of the responding facilities have ≤ 50 beds. This suggests that the uptake of influenza vaccine among staff is low. An immunization campaign directed at health care workers might improve the uptake of vaccine among staff, as well as increase their knowledge of the vaccines needed by patients and seniors in general.

Duclos et al[4] found that adults > 65 years of age and those with risk factors such as chronic heart or lung problems are under-immunized, with ≥ 50% receiving influenza vaccine. Tilghman[8] stated that several U.S. states taking part in the Flu/Pneumo 2000 Campaign have successfully implemented influenza vaccination blitzes that target these groups, particularly those with current medical problems, as they are likely to end up in hospital if they develop influenza. Under this program, all hospital and emergency room admissions are reviewed for indications for influenza immunization between December 1 and 15. If vaccine is indicated but not yet given, patients are offered it at that time. Such a program could be implemented provincially with appropriate motivation of hospital staff.

Conclusions and Recommendations

The benefits of maximizing influenza vaccine uptake in adults and children at risk of complications from the infection are multiple. The beneficiaries include the vaccine recipient, their families and the health care system. It is in the interest of the local health authorities and hospitals to promote appropriate vaccine use to avoid the costs involved in caring for patients with preventable complications of influenza.

The uptake of influenza vaccine among adults living in long-term care facilities in BC is good. Areas that need attention are the following: 1) improving the uptake of influenza vaccine among staff working at such facilities, and 2) implementing programs to immunize adults who are admitted to facilities during the entire influenza season. It should also be investigated whether standing orders as opposed to individual physician orders for vaccine would facilitate uptake.

Acknowledgements

We would like to thank the staff of the long-term care facilities for completing the questionnaires, and the Vaccine Evaluation Centre staff for their assistance with this project. This study was funded by a grant from the BC Centre for Disease Control, Vancouver, BC.

References

1. LCDC. *Canadian consensus conference on influenza.* Can J Infect Dis 1993;4:251-56.
2. LCDC. *Canadian immunization guide.* 4th ed., Ottawa: Supply and Services Canada. Cat. no. H49-8/1993E.
3. McArthur MA, Simor AE, Campbell B et al. *Influenza and pneumococcal vaccination and tuberculin skin testing programs in long-term care facilities: where do we stand?* Infect Control Hosp Epidemiol 1995;16(1):18-24.

4. Duclos P, Hatcher J. *Epidemiology of influenza vaccination in Canada*. Can J Public Health 1993;84(5):311-15.

5. Statistics Canada. *Profile of census divisions and subdivisions in British Columbia. Part A*. Ottawa, ON: Statistics Canada, 1992.

6. Gutman GM, Wister AV, Campbell H et al. *Fact book on aging in British Columbia*. 2nd ed., Vancouver: Gerontology Research Centre, Simon Fraser University, 1995.

7. Potter J, Stott DJ, Roberts MA et al. *Influenza vaccination of health care workers in long-term care hospitals reduces the mortality of elderly patients*. J Infect Dis 1997;175:1-6.

8. Tilghman J. HCFA's Flu/Pneumo 2000 Campaign. Oral presentation at the 31st National Immunization Conference. Detroit, Michigan. May 19-22, 1997.

International Notes

Rubella Among Crew Members of Commercial Cruise Ships – Florida, 1997

Adapted from MMWR Vol 46, Nos 52 and 53, 1998

During April to July 1997, two different commercial cruise lines notified the Centers for Disease Control and Prevention (CDC) of rubella outbreaks among crew members. In July 1997, CDC initiated an investigation on one cruise ship to determine the extent of and risk factors for rubella infection among crew members and to assess the potential risk of transmission to passengers particularly pregnant women at risk of giving birth to an infant with congenital rubella syndrome (CRS). This report summarizes rubella outbreaks involving two cruise ships and the results of the CDC investigation on one cruise ship, which demonstrate that crew members can serve as a susceptible population for rubella infection and should be vaccinated with measles-mumps-rubella vaccine (MMR) if they are not immune. Although the outbreaks were limited to crew members, cruise ship travel provides an environment conducive to the potential spread of rubella and other infectious diseases among crew and passengers; therefore, women of childbearing age, particularly pregnant women, should be immune to rubella before travelling on cruise ships to reduce the risks of infection and CRS.

Cruise Ship A

On April 7, cruise line A notified CDC about a rash illness in a crew member aboard one of the ships in its fleet. The ship sailed twice a week from Florida on 3-day cruises to the Bahamas, carrying approximately 900 crew members and 2,000 passengers per cruise. During May and June, rash illnesses were reported in six additional crew members; five of the seven cases were confirmed serologically (by immunoglobulin [Ig] M antibodies) as acute rubella infection. A survey of the crew members conducted by the cruise line indicated that a substantial proportion had no documentation of rubella vaccination and that at least 95% were not Americans. Because of evidence of ongoing rubella transmission among crew members (many of whom were natives of countries without rubella vaccination programs) and the potential for transmission to female crew members and passengers of childbearing age, CDC advised the cruise line to initiate a vaccination campaign with MMR during June. Serologic susceptibility testing was recommended for all crew members ineligible for vaccination, including pregnant women. Cruise line staff and state/local health department personnel vaccinated 865 (96%) of the approximately 900 crew members who had no documented rubella vaccination or immunity. Following the vaccination campaign, one additional rash illness was reported in a crew member and subsequently was serologically confirmed to be consistent with acute rubella infection. This crew member had received an MMR vaccine < 2 weeks before the rash onset.

Cruise Ship B

On July 25, cruise line B notified CDC about a cluster of rash illnesses among crew members of one of its ships sailing between Florida and the Bahamas. The cruise ship sailed daily from Florida with a crew of 385 and carried approximately 8,400 passengers per week. CDC initiated an investigation in July to determine the extent of the outbreak and risk factors for rubella infection among crew members and to assess the potential risk of transmission to passengers, particularly pregnant women at risk for serious adverse health outcomes (including CRS).

The investigation included a review of the ship's medical logs and interviews and examinations of the 385 crew members. Because approximately 25% to 50% of infections are asymptomatic[1], a serosurvey of rubella IgM and IgG antibodies was conducted among 366 consenting crew members. A confirmed case was defined as IgM serology consistent with rubella infection, or signs and symptoms meeting the clinical case definition for rubella and linked epidemiologically to a laboratory-confirmed case with onset during May 30 to August 2. Rubella was confirmed in 16 (4%) crew members; all confirmed cases had IgM serology consistent with the infection. Of 16 crew members with IgM-confirmed infections, eight (50%) had no symptoms. An additional 25 (7%) of the 366 crew members surveyed were susceptible to rubella at the time of the serosurvey. The crew interviews indicated that approximately 85% of the crew members were not Americans (representing at least 50 countries), and 75% had negative or unknown rubella vaccination histories. Crew members living aboard the ship were more likely to have confirmed rubella than were crew members living ashore (16 of 288 versus zero of 78; relative risk = 9.0 [Woolf's estimate], $p = 0.03$).

To determine demographic characteristics of passengers on cruise ship B and identify pregnant women who, if susceptible to rubella, could be at risk for giving birth to infants with CRS, a

questionnaire was administered to passengers sailing on cruises during August 4 to 8. All passengers (approximately 6,000) received a health alert about the rubella outbreak before boarding the ship; 3,643 (61%) passengers completed the questionnaire. Among the respondents, approximately 75% of passengers were Americans, 12% were born in the Bahamas, and 13% were born in other countries. A total of 1,213 (33%) of the 3,643 respondents were women of childbearing age (i.e., 15 to 44 years); 28 (0.8%) of all respondents were pregnant women, of whom 14 (50%) reported being in the first trimester. Although the rubella immune status of these pregnant passengers was not determined, previous serosurveys in the U.S. population suggest that approximately 10% of women of childbearing age may be susceptible to rubella, and up to 85% of susceptible pregnant women who are infected during their first trimester may give birth to an infant with CRS[2].

MMWR Editorial Note: Although rubella is typically a mild, self-limited disease in adults, infection in pregnant women can result in serious adverse health outcomes for the fetus, including CRS, a group of birth defects including deafness, cataracts, heart defects, and mental retardation. In the U.S., approximately 10% of young adults are susceptible to rubella; in other countries, some without routine vaccination policies for rubella, susceptibility rates range from 4% to 68%[3]. During 1994-1996, 12 laboratory-confirmed cases of CRS were reported in the U.S.[4].

Although a definitive quantitation of the risk for transmission of rubella among crew members and passengers on the cruise ships could not be ascertained, risk for infection among those crew members of cruise ship B could be estimated. Results of the serosurvey among crew members indicate that at least 41 (11%) of 366 were acutely infected with or susceptible to rubella at the time of the serosurvey. This serosurvey was conducted after recognition of an ongoing outbreak of rash illnesses among crew members, and it is likely that rubella susceptibility rates at the outset of the outbreak would have been higher.

The risk for transmission of infection and an outcome of CRS in pregnant passengers in their first trimester on cruise ship B was difficult to determine because 1) the rubella immune status of these pregnant passengers was unknown and 2) the consequences of rubella infection in susceptible pregnant women (i.e., CRS) may not be evident for several months after the exposure. If pregnant passengers were exposed, and assuming that approximately 10% of these women were susceptible to rubella and 85% of susceptible pregnant women who are infected during their first trimester will give birth to an infant with CRS, one case of CRS could potentially occur each week among passengers sailing during the outbreak.

Minimizing or eliminating the risk for rubella exposure among susceptible pregnant women is important because of the potential for serious adverse health outcomes for the fetus. To interrupt transmission of rubella among crew members and to prevent transmission of infection and CRS among susceptible pregnant women, CDC recommended administration of MMR to all crew members lacking documented immunity to rubella; serologic testing to determine susceptibility to rubella for all crew members ineligible for vaccination, including pregnant women; active surveillance aboard the ship to detect new rubella infections; prospective notification of the potential risk for rubella exposure to all embarking passengers until 30 days after the last confirmed rubella infection; and retrospective notification to all passengers sailing during the period of potential rubella transmission. These recommendations were effective in interrupting the transmission among crew members on cruise ship B. No additional rash illnesses were identified after their implementation.

This report of two clusters of rubella infections on commercial cruise ships demonstrates that crew members – many from countries without routine rubella vaccination programs – are potential groups of susceptible persons at risk for infection. To prevent future outbreaks among such persons, CDC recommends that cruise lines administer MMR to all crew members without documented immunity to rubella. Although reported rubella cases in these two outbreaks were limited to crew members, cruise ship travel provides a semi-closed environment for crew and passenger interactions, conducive to the potential spread of rubella and many other infectious diseases among crew and passengers. To prevent transmission of rubella infection and subsequent CRS, women of childbearing age, particularly pregnant women, should be immune to rubella before cruise ship excursions or international travel.

The outbreaks described in this report illustrate the potential for transmission of infectious diseases among persons travelling across international borders, including aboard commercial cruise ships. Previous infectious disease outbreaks reported among crew members and passengers have included diarrheal diseases and other vaccine-preventable diseases such as influenza[5]. Approximately 4 million persons travel aboard North American cruise ships each year (CDC, unpublished data, 1998). Ensuring routinely recommended adult vaccinations for all crew members will substantially decrease the potential for future outbreaks of vaccine-preventable illnesses aboard cruise ships.

References

1. American Academy of Pediatrics. *1997 Red book: report of the Committee on Infectious Diseases*. 24th ed. Elk Grove Village, Illinois: American Academy of Pediatrics, 1997.
2. Miller E, Cradock-Watson JE, Pollock TM. *Consequences of confirmed maternal rubella at successive stages of pregnancy*. Lancet 1982;2:781-84.
3. Cutts FT, Robertson SE, Diaz-Ortega JL et al. *Control of rubella and congenital rubella syndrome (CRS) in developing countries, part 1: burden of disease from CRS*. Bull World Health Organ 1997;75:55-68.
4. CDC. *Rubella and congenital rubella syndrome – United States, 1994-1997*. MMWR 1997;46:350-54.
5. CDC. *Update: influenza activity – United States, 1997-98 season*. MMWR 1997;46:1094-98.

International Initiatives for Raising Immunization Coverage

(Adapted from Expanded Programme on Immunization (EPI) Update 32, WHO, November 1997)

The following examples cite program initiatives in other countries highlighted by the Global Programme for Vaccines and Immunization (GPV) of the World Health Organisation. They are presented in the *Update* as food for thought and an invitation for readers to share their own success stories. **Readers who wish to share examples of successful initiatives in their own programs or other ideas on how to raise immunization coverage may forward those ideas by e-mail to GPV@who.ch or by post to GPV/WHO, Geneva. The editors of the *Update* would appreciate receiving such information as well.**

Considering payment of parents and doctors for child vaccination – Australia: The GPV reports that Health Minister Michael Wooldridge, in a call for "drastic action" to raise Australia's childhood immunization coverage rates, announced in January 1997 his preparedness to look at any option that will help to get the country's immunization rate up to an acceptable international level by the year 2000. One option that was being considered was to give cash to parents and doctors and free fast-food vouchers to children as incentives to comply with recommended vaccination schedules. A second option was to set up immunization clinics at supermarkets and shopping centres. Coverage figures for Australia, according to the latest available data quoted (April 1995) from the Australian Bureau of Statistics, indicated that only about half of the 1.8 million children < 6 years of age were fully immunized. Dr. Wooldridge announced that he aims to raise the rate to 95% over the next 3 years.

Rewarding successful clinics – State of Georgia (United States): According to the GPV, the state of Georgia, worried by low immunization coverage in its 230 state clinics, developed techniques to try to raise coverage. Techniques included publishing rank order lists of clinics by coverage, honouring clinics that achieved high coverage, and holding annual meetings where clinic workers shared successes with fellow workers. In 4 years, coverage was reported to increase from 53% to 89%.

Improving family doctor services – United Kingdom: The GPV notes that some industrialized countries such as the United Kingdom pay an incentive to family doctors for reaching required target levels of immunization for patients registered under their care.

Vaccine-Preventable Diseases Summary

Cumulative number of cases reported* for selected vaccine-preventable diseases, Canada, January 1995 - December 1997

Divisions of Immunization and Disease Surveillance, Bureau of Infectious Diseases, LCDC, Ottawa

Disease	1995	1996	1997
	Jan-Dec	Jan-Dec	Jan-Dec
Diphtheria	2	0	1
Haemophilus influenzae type b	55	55	57
Measles§	2,361	306	572
Mumps	402	294	258
Rubella¶	300	276	3,455
Congenital rubella syndrome	2	1	0
Pertussis	9,799	5,147	3,688
Paralytic poliomyelitis	1‡	0	0
Tetanus	6	2	3

* Based on cases reported to the *Notifiable Disease Reporting System*, Division of Disease Surveillance, LCDC; 1996 and 1997 data are provisional. Also cumulative totals for the current year to date may not represent national totals due to incomplete reports from the provinces/territories.

§ Measles data are based on cases reported to the *Enhanced Measles Surveillance System*, Division of Immunization. The majority of cases in 1997 were reported from British Columbia (47%) and Alberta (43%).

¶ Approximately 98% of rubella cases reported in 1997 were reported from Manitoba where an outbreak of rubella occurred, starting October 1996 through December 1997.

‡ The single report was a case of vaccine-associated paralytic poliomyelitis in a male adult (30 to 39 years old).

Announcements

Guidelines for Childhood Immunization Practices

We wish to bring our readers' attention to the publication of the *Guidelines for Childhood Immunization Practices*, prepared by the National Advisory Committee on Immunization. The *Guidelines* were published in the December 1, 1997 issue of the *Canada Communicable Disease Report* 1997;23(ACS-6):1-12. The publication can also be accessed electronically via Internet using a Web browser at http://www.hc-sc.gc.ca/hpb/lcdc.

3rd Canadian National Immunization Conference

Partnerships for Health Through Immunization

The Calgary Convention Centre, Calgary, Alberta, Canada
December 6 - 9, 1998

Organized By

The Laboratory Centre for Disease Control, Health Canada, and the Canadian Paediatric Society

Objectives

To present a forum for discussion and information exchange related to the practical aspects of immunization programs in Canada, and means of improving them. This will cover issues such as vaccine supply and delivery, education, assessment of vaccine programs, regulations and legislations, and global immunization efforts. The conference will look at both programmatic and disease-related issues, with primary focus being on programmatic issues. The main focus will be on childhood immunization. There will also be an examination of progress towards the achievement of established Canadian national goals for the reduction of vaccine-preventable diseases of infants and children.

To access information as it becomes available, or to be put on the conference mailing list, visit the Conference Website at:

http://www.hc-sc.gc.ca/hpb/lcdc/events/cnic/index.html

Or fax your request to:
Chuck E. Schouwerwou, BA, CMP
Conference and Committee Coordinator
Division of Immunization
Fax: (613) 952-7948

Note that the proceedings of the previous Canadian National Immunization Conferences can also be accessed at that site.

Our mission is to help the people of Canada maintain and improve their health.
Health Canada

Submissions of pertinent reports/epi notes are welcome and the success of this endeavor 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 Division of Immunization, Bureau of Infectious Diseases, LCDC, Ottawa, Ontario, K1A 0L2; telephone (613) 957-1340; FAX (613) 952-7948. This publication can also be accessed electronically via Internet using a Web browser at http://www.hc-sc.gc.ca/hpb/lcdc

Editors:
Adwoa Bentsi-Enchill (613) 954-4365
Philippe Duclos
Division of Immunization
Bureau of Infectious Diseases
FAX: (613) 952-7948

Preparation:
Editorial and Production Services
Dissemination Division
Bureau of Stategic Planning and Risk Management

Laboratory Centre for Disease Control, Health Canada
Tunney's Pasture, Ottawa, Ontario K1A 0L2