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IMMUNIZATION SURVEY OF NON-INSTITUTIONALIZED ADULTS — QUEBEC (as of May 30, 1996)

Immunization is considered the most effective and least costly way of preventing certain infectious diseases, and the complications and deaths that result from them. For a number of years experts have stressed the importance of vaccinating adults as well as children, e.g. booster shots for diphtheria and tetanus every 10 years; annual influenza vaccination for persons ≥ 65 years, and persons at risk for influenza-related complications; pneumococcal vaccination for persons ≥ 65 years, and persons at risk for complications; and hepatitis B vaccination for members of risk groups[1,2]. However, in Canada and the rest of the world, the focus has been mainly on the management and evaluation of immunization programs for children. There have been few studies on the immunization of non-institutionalized adults, and the extent of public awareness of recommendations for adult vaccination and their administration is not known. There are, however, good indications that adult vaccination has not been as successful as child vaccination[3,4,5]. Further information and better knowledge of the situation are needed to determine what promotional activities and programs should be established.

At the request of the *Ministère de la Santé et des Services sociaux du Québec* (MSSS), the *Centre d'épidémiologie d'intervention du Québec* (CEPIQ) conducted a survey to evaluate the immunization of Quebec's non-institutionalized adult population ≥ 18 years, to propose measures for improving vaccination coverage. The survey had six specific goals: 1) to determine the level of vaccine coverage for influenza, pneumococcus, hepatitis B, tetanus, and diphtheria; 2) to evaluate individuals' knowledge of their immunization status; 3) to explore the role of certain determinants of influenza vaccination; 4) to identify attitudes towards and perceptions of vaccination; 5) to determine the locations and circumstances of vaccination; and 6) to assess missed opportunities for vaccination.

Method

A cross-sectional descriptive study was conducted under the auspices of the CEPIQ from 20 May to 8 June 1996. The target population was all non-institutionalized persons ≥ 18 years residing in Quebec. A random sample of 2,000 telephone numbers was obtained by a simple systematic drawing of Quebec residential numbers (excluding unlisted and cell phone numbers) from lists provided by Bell through Tele-Direct Inc. The lists were sorted prior to sampling by postal code and alphabetical order to ensure sample representativeness. A pre-tested questionnaire was conducted by telephone in French or English, depending on the respondent's preference. The calls were placed between 8:30 and 21:00 on 30 May 1996. The interviewers made a maximum of five attempts to reach each household over different time periods to reduce the non-response bias. Data were entered and analyzed using the Epi Info software (version 6.03). Results were weighted by age and sex, using population projections for 1996 based on the 1991 census. The following age categories were used for weighting purposes: 18 to 29 years; 30 to 44 years; 45 to 64 years; and ≥ 65 years. Subjects had to have received a dose of vaccine in the last year to be considered properly vaccinated against influenza, and a dose of vaccine over the past 10 years for tetanus and diphtheria. A single lifetime dose was sufficient for pneumococcus. Hepatitis B vaccination was considered adequate if three doses had been received.

Results

Out of the 2,000 numbers dialed, 1,234 questionnaires (61.7%) were completed: 433 households (21.7%) could not be reached, 225 individuals (11.3%) declined to participate and 108 (5.4%) did not meet study criteria. Of the respondent sample, 69.2% was female. The ≥ 65 age group was slightly overrepresented in relation to the projections for the Quebec population (18.4% of the sample vs. 15.7% expected before weighting). The 18 to 29

year-old age group was underrepresented (10.5% of the sample vs. 20.9% expected before weighting).

Table 1 shows the vaccination coverage data. Men had a higher coverage for tetanus than women, and coverage declined with age for both sexes. Up to 66.8% (95% CI: 63.9 69.7) of respondents knew of recommended vaccines for adults. Of these, 57.3% spontaneously named the influenza vaccine; 13.3%, the hepatitis B vaccine; 11.5%, the tetanus vaccine; 1.3%, the diphtheria vaccine; and 0.2%, the pneumococcus vaccine. In addition, 26.4% mentioned vaccines for travellers or other unspecified vaccines.

Only 22.0% (95% CI: 19.5 24.5) of respondents said that they had an immunization booklet or certificate. Of those who had no documents, 54.6% said that they knew where to obtain information about their immunization status: 52.2% of these named a *Centre local de services communautaires* (CLSC); 30.0%, a doctor's office; 14%, a hospital; 9%, parents; and 1%, school.

Chronically ill people and persons ≥ 65 years responded to a multiple-choice question about the main reason for having influenza vaccinations: 36.2% (95% CI: 25.2 47.3) indicated a doctor's advice; 36.3% (95% CI: 25.0 47.6), the belief that the vaccine would prevent the disease; 16.5% (95% CI: 7.2 25.8), the habit of receiving the vaccine; and 11.0% (95% CI: 3.8 18.0), confidence in the vaccine. The main reason for not having influenza vaccinations was indicated by 44.1% (95% CI: 34.9 53.2) as the belief that they did not need it; 17.3% (95% CI: 10.4 24.0), fear of adverse reactions; 14.5% (95% CI: 7.9 21.0), belief that it was ineffective; and 7.8% (95% CI: 2.9 12.7), that their doctor had not advised it.

Of all adults who received influenza vaccinations, 66.2% (95% CI: 55.0 77.4) were vaccinated in doctors' offices, and 21.5% (95% CI: 11.8 31.3) in a CLSC. Influenza vaccinations were received by 75.1% (95% CI: 65.1 85.1) of adults during routine visits to doctors' offices.

Only 11.6% (95% CI: 9.7 13.5) of all respondents were aware of the existence of pneumococcal vaccine. This is probably an overestimate of actual knowledge because some of the questions respondents asked suggested that they may have confused pneumococcus with meningococcus, or with invasive streptococcal disease.

In response to a multiple-choice question about the circumstances of tetanus vaccination, 71.7% (95% CI: 66.7 76.8) of vaccinated individuals indicated an injury; 13.9% (95% CI: 10.1 17.8), jobs or student status; 7.4% (95% CI: 4.5 0.2), preparation for a trip; and 2.5% (95% CI: 0.9 4.1), a routine office visit. Vaccination was received by 51.1% (95% CI: 45.5 56.7) in hospital settings; 20.3% (95% CI: 15.9 24.7) in doctors' offices; 10.8% (95% CI: 7.3 14.2) in a CLSC; 7.2% (95% CI: 4.4 10.0) in schools; 3.8% (95% CI: 1.7 5.9) in travel clinics; and 1.8% (95% CI: 0.3 3.4) at work.

In response to a multiple-choice question about the main reason for not being vaccinated for tetanus, 78.7% (95% CI: 75.7 81.8) of unvaccinated persons indicated that they did not need it; 9.0% (95% CI: 6.9 11.1), that their doctor had not advised it; 5.6% (95% CI: 3.9 7.3), not aware it existed; 0.8% (95% CI: 0.2 1.3), fear of adverse reactions; and 0.1%, belief that it was ineffective.

Table 1
Reported vaccination coverage (weighted)

	Vaccination coverage (%)	95% CI
Influenza		
Population as a whole	11.0	9.1–12.9
Persons ≥ 65 years	39.7	32.6 – 46.8
Persons aged 18-64 years with risk factors	18.4	10.6–26.1
Pneumococcus		
Population as a whole	1.2	0.5– 1.9
Persons ≥ 65 years	1.8	0.0– 3.8
Persons aged 18-64 years with risk factors	1.9	0.0– 3.9
Tetanus		
Population as a whole	32.5	29.7–35.5
Men		
≥ 18 years	40.5	35.5–45.5
18 to 29 years	57.1	46.6–67.7
30 to 44 years	44.9	36.2–53.5
45 to 64 years	36.1	27.0–45.2
≥ 65 years	10.4	1.7–19.1
Women		
≥ 18 years	25.1	22.1–28.1
18 to 29 years	47.3	38.7–55.9
30 to 44 years	23.7	18.9–28.6
45 to 65 years	20.0	14.9–25.1
≥ 65 years	11.2	6.6–15.8
Diphtheria	2.3	1.4–3.1
Hepatitis B		
At least one dose	10.0	8.1–11.8
At least three doses	4.1	2.9–5.3

In response to a multiple-choice question about the circumstances of their hepatitis B vaccination, 67.9% (95% CI: 53.4 82.5) of vaccinated persons indicated jobs or student status; 1.4% (95% CI: 0 4.1), injury; and 13.1% (95% CI: 1.9 24.3), preparation for a trip. No one said that they had been vaccinated because of contact with an infected individual. Vaccination was received by 20.8% (95% CI: 8.7 33.0) at work.

With respect to missed opportunities for vaccination, 75% of all those properly vaccinated for influenza during the year were not up to date with their tetanus vaccinations. Of those ≥ 65 years vaccinated for influenza, 90% had seen a doctor in the past year.

Discussion

Although the percentage of persons opposed to vaccination may be higher amoung non-respondents, the small proportion attributing their opposition to side effects or a lack of confidence in vaccines indicates that, overall, the negative attitude toward immunization is small. However, despite the recommendations of the *Comité sur l'immunisation du Québec*, the survey found that undervaccination is common. Furthermore, knowledge about vaccines (depending on the vaccine) and the need to be vaccinated is inadequate. Vaccination coverage data are consistent with survey data recorded in 1994 for Canada as a whole[3]. Regarding influenza, on the basis of data obtained during the course of a general social survey published in 1993, vaccination coverage among persons ≥ 65 years increased from 36.9% for the 1990-1991 season to 39.7% for the 1995-1996 season[4]. This increase is limited and the MSSS objective of vaccinating 60% of persons ≥ 65 years and persons with risk factors is far from being achieved.

It should be noted that 94% of persons immunized against tetanus said that they had not received the diphtheria vaccine. However, a combined diphtheria-tetanus vaccine had been administered in the vast majority of cases if the number of distributed doses of tetanus vaccine or combined tetanus-diphtheria vaccine in recent years is considered. These patients may not have been informed that they were being given the diphtheria vaccine along with the tetanus. It is also possible that doctors prescribe only the tetanus vaccine following injuries, whereas the patients are actually given the combined vaccine. It is also possible that persons immunized following an injury focus on the tetanus and the other vaccine component is forgotten. Diphtheria vaccination coverage is probably greatly underestimated in this study. The results demonstrate the importance of improving the quality of the information given to patients about the vaccines administered to them.

The responses relating to the reasons for and circumstances of vaccination show that doctors have a major role to play in adult immunization. The study also revealed many missed opportunities for vaccination that deserve closer attention. Even when persons ≥ 65 years do not visit their doctors during the influenza immunization season, each visit, except for rare extreme emergencies, can be a time to advise patients on appropriate vaccinations for their ages and states of health. This does not preclude the role of provincial and federal governments in promoting immunization.

It is essential to promote immunization among health-care providers and target populations, and to ensure that programs (for example, pneumococcus) are brought into line with the health needs of the population. It is also important to develop strategies for making adults aware of their immunization status and the times when they should receive their next vaccination. Such strategies could include advertising and pamphlet distribution in doctors' offices, implementing individual proof of vaccination and a telephone or mail reminder system, and using children's immunization appointments to inform parents of their own immunization needs.

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Source: *P Duclos, PhD, H Arruda, MD, J-C Dessau, MD, R Dion, MD, M Dupont, MD, C Gaulin, MD, J-L Grenier, MD, M Savard, MD, G Trudeau, MD, M Douville-Fradet, MD, D Beauséjour, MD, A Bergeron, MD, J-P Bergeron, MD, M Castonguay, Nurse, P Clermont, Nurse, J Cloutier, MD, L Côté, MD, E Czyziw, MD, M Dubuc, DVM, M-A D'Halewyn, MSc, A Fortin, MD, M Frigon, MD, M Gélinas, Microbiologist, I Kirouac, MD, M Landry, MD, R Lattier, MD, E Levac, MD, S Palmieri, MD, L Paré, Nurse, J-F Proulx, MD, S Provost, MD, D Ramsay, Microbiologist, H Rodrigue, Nurse, R Veillette, MD, S Venne, MD; Intensive Session of Epidemiology, CEPIQ, Mont Sainte-Anne, Quebec.*

ADULT IMMUNIZATION SURVEY — OTTAWA, 1996

The completion rate of almost 62% for the *Centre d'épidémiologie d'intervention du Quebec* (CEPIQ) immunization survey was excellent, given the one-day time limit. Excluding the 108 households which did not meet study criteria, the completion rate was even better at 65%. As anticipated prior to the survey, seniors and women were over sampled; this was acceptable, since influenza and tetanus coverage of seniors was of interest and data were available to weight the results by age and gender strata.

A parallel survey was done by the class of the Laboratory Centre for Disease Control (LCDC) Field Epidemiology Course held in Ottawa during July, 1996. As with the CEPIQ course, students managed all aspects of the survey under the supervision of a team of instructors, and followed objectives set by the Ottawa-Carleton Regional Health Unit. Students did not have access to the Quebec questionnaire, yet their final survey instruments were similar.

The Ottawa survey used a random selection of published telephone numbers which was pre-screened to exclude numbers outside the Ottawa-Carleton region. Between 14:00 and 21:00 on one weekday, 878 calls were made with a small number of follow-up calls the next day. The completion rate was lower, at 45% of numbers dialled. This may be attributed to the timing (July) and shorter duration of calling; 36% of households could not be reached, compared to 22% in the CEPIQ survey.

Coverage tended to be higher in the Ottawa survey, which may reflect the more homogenous urban population served by this large, teaching health unit. Weighted estimates of coverage were 50% for tetanus, 60% among those for whom influenza vaccine is recommended (≥ 65 years or certain chronic medical conditions) and 8% of those for whom pneumococcal vaccine is recommended. As in the Quebec survey, missed opportunities for immunization were frequent: 83% of 94 individuals who had not received tetanus toxoid in the past 10 years reported a visit to their physician in the past year, as did 35% of the 89 influenza vaccine candidates who were not immunized in the previous year.

These rapid telephone surveys were limited by short time frames, an inability to confirm immunization status, and respondents' confusion about the actual composition of some vaccines. By coincidence, the Ottawa survey was done on the day that the Ontario Ministry of Health announced its pneumococcal vaccine program. Even a few hours after the announcement, some respondents mentioned the Ministry program. Given greater time to standardize the questionnaire, such surveys could be used to provide provincial or local health authorities with useful information on vaccine coverage before, during, or after immunization campaigns.

Source: *J Hockin, MD, D Buckeridge, MD, C Craig, DVM, S Deeks, MD, M Finkelstein, MD, M Fyfe, MD, S Isaacs, MSc, M Maher, MD, A McCarthy, MD, S Onno, MSc, P Powell, MSc, V Roth, MD, Y Sivji, MD, R Slinger, MD; Field Epidemiology Training Program, LCDC, Ottawa, Ontario.*

BOTULISM IN CANADA — SUMMARY FOR 1995

Seven outbreaks of foodborne botulism, involving 13 cases with no deaths, were confirmed in 1995 (Table 1). Traditional fermented Inuit foods were implicated in five of the outbreaks. Four of the seven outbreaks occurred in the Nunavik region of Quebec where there have been 10 outbreaks of botulism in the last 5 years, all involving type E strains. Different types of seal products have been incriminated in most of these cases.

Four other possible foodborne outbreaks were investigated but no association with Clostridium botulinum could be found. Twentyfour cases of sudden infant death syndrome were investigated; one case was associated with *C. botulinum*.

One case of infant botulism, involving an 8-week-old female, occurred in April 1995. Honey, containing between 0.2 and 2.0 spores/g, was implicated in this incident. *C. botulinum* type A was isolated from both the infant's stool and the honey.

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Source: *J Austin, PhD, Botulism Reference Service for Canada, Health Protection Branch, Health Canada, Ottawa, Ontario.*

Table 1
Foodborne Botulism In Canada, 1995

Incident	Month	Location	Suspected food	Total cases	Fatal cases	Toxin type	Specimens with viable *C. botulinum*	Specimens with *botulinum* neurotoxin
1	January	Tuktoyuktuk, N.W.T.	muktuk	1	0	E	not tested	muktuk
2	July	Kangiqsualujjuaq, Quebec	miseraq	1	0	E	miseraq	none
3	August	Kuujjuaq, Quebec	seal	2	0	E	seal, stool, gastric liquid	seal, serum, stool
4	August	Tasiujaq, Quebec	walrus	5	0	E	walrus, stool, gastric liquid	walrus, serum, stool
5	August	Sherbrooke, Quebec	pâté	2	0	B	pâté, stool	none
6	September	Whitehorse, Yukon	marinated and smoked fish	1	0	E	stool	serum, stool
7	September	Kuujjuaq, Quebec	seal meat	1	0	E	seal meat	seal meat

BOTULISM REFERENCE SERVICE FOR CANADA

The Botulism Reference Service (BRS) for Canada, established at the Health Protection Branch in Ottawa in 1974, has the following objectives:

- to assist physicians and Provincial Departments of Health when botulism is suspected;
- to examine suspect foods and clinical specimens submitted for analysis;
- to rapidly alert responsible agencies when commercial foods are involved;
- to maintain reference cultures of *Clostridium botulinum*; and
- to liaise with centres that have similar interests and responsibilities in Canada and abroad.

Botulism is a neuroparalytic disease with mortality rates in Canada of about 14%. Most foodborne outbreaks in Canada are due to home-prepared foods, especially fermented Inuit foods, and improperly stored meat of marine origin; however, some involve commercially prepared foods. Symptoms of foodborne botulism include ptosis, visual disturbance, vomiting and diarrhea, dry mouth and sore throat, followed by descending symmetrical flaccid paralysis in an alert afebrile person. Similar symptoms are associated with wound botulism, but vomiting does not occur. The earliest and most frequently observed symptom of infant botulism is constipation followed by lethargy, poor feeding, ptosis, difficulty swallowing, hypotonia, and generalized weakness ("floppy" baby). In cases of foodborne or wound botulism, specific antitoxin is administered as soon as possible. For all types of botulism, accessibility to respiratory support is essential.

When botulism is suspected, a member of the BRS should be called immediately, day or night. The possible diagnosis of botulism should be validated by checking the case history, and plans for transporting suspect food and clinical specimens to Ottawa for laboratory analysis can be finalized. The food samples may be leftovers or unopened containers. When commercial foods are involved, it is important to retrieve the label, the manufacturer's lot number, codes embossed on the can or package, etc. Suitable clinical specimens for analyses include fecal samples (approximately 10 g) or enema fluid, gastric contents (adjusted to approximately a pH of 6.0 with 1N NaOH, if possible) and serum (from 20 mL of blood collected **BEFORE** administration of antitoxin). When infant botulism is suspected, the essential material for analysis is the infant's feces. If necessary, soiled parts of diapers may be submitted.

For safe shipment, the specimens must be in a watertight primary receptacle, in a watertight secondary container, with sufficient absorbent material between the two containers to absorb the entire contents of the primary receptacle. The preferred method of preserving the material during shipment is by cooling rather than freezing, i.e., by including commercial cooling packs in the parcel. In urgent cases, the parcels are picked up immediately upon arrival.

The persons or agencies listed below may be called for laboratory services or medical consultation. Antisera may be obtained directly from Connaught Laboratories.

Laboratory Services

J. Austin, PhD, Chairman [office (613) 957-0902, home (613)841-7621]; E. Todd, PhD, Vice Chairman [office (613)957-0887, home (613) 225-4316]; B. Blanchfield, Analyst [office (613) 957-0885, home (613) 225-4969], Health Protection Branch, Health Canada, Ottawa, Ontario, KIA 0L2, Postal Locator 2204A2.

Epidemiologic Consultation

Dr. J. Hockin, Chief, [office (613) 957-1764] Field Epidemiology Division, Bureau of Communicable Diseases, Laboratory Centre for Disease Control, Health Canada, Ottawa, Ontario, K1A 0L2, Postal Locator 0602B.

Supplier of Antisera

Connaught Laboratories Ltd., 1755 Steeles, Avenue West, Willowdale, Ontario, M2R 3T4, (416) 667-2701.

Source: *J Austin, PhD, Botulism Reference Service for Canada, K Dodds, Bureau of Microbial Hazards, Food Directorate, Health Protection Branch, Health Canada, Ottawa, Ontario.*

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