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CANADIAN IMMUNIZATION: PUBLIC PROGRAMS OR PRIVATE ENTERPRISE?¹

Lynn McIntyre² and Franklin White³

INTRODUCTION

Immunization programs in Canada fall mainly within provincial and territorial jurisdictions. Childhood vaccinations are carried out almost exclusively by public health departments in Alberta, Saskatchewan, Prince Edward Island, and the Northwest Territories. In the other seven provinces, physicians and public health departments share the responsibility for immunization. The Federal Government maintains an immunization policy advisory role, conducts national disease surveillance and reference laboratory activities, is responsible for product regulation, and provides direct immunization services to specified populations (e.g., those of the Yukon Territory, Canadian Armed Forces, and

the federal public service). Despite this clear lack of uniformity in its childhood immunization delivery systems, however, Canada has a remarkably good record of controlling vaccine-preventable diseases of childhood (1).

In general, three immunization service models can be identified in Canada, these being public (with vaccinations being provided almost entirely by public health nurses who are public service employees); private (with vaccinations being provided by private medical practitioners); and mixed (with vaccinations being provided to varying degrees by public and private health personnel).

Recommendations for vaccine use are made at the national and provincial levels by various advisory bodies, the most senior of which are the National Advisory Committee on Immunization (NACI) and the Infectious Diseases and Immunization Committee of the Canadian Pediatric Society. Much attention has been paid to a historical lack of uniformity among public, private, provincial, and federal immunization schedules (2, 3). However, less variation exists now than formerly among provincial schedules, and the remaining flexibility in schedules permits greater adaptability in times of vaccine shortage—an adaptability that is appropriate where evidence concerning the relative merits of differing program options is lacking or contradictory.

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² Department of Community Health and Epidemiology, Dalhousie University, Halifax, Canada; and hospital epidemiologist, Izaak Walton Killam Hospital for Children, Halifax.

³ Department of Community Health and Epidemiology, Dalhousie University, Halifax; and President, Canadian Public Health Association, Ottawa.

Compared with research on immunizing agents and vaccine-preventable diseases, the study of immunization program delivery is a relatively recent endeavor. Documentation of program effectiveness and quality control is limited, and more operational research is required. This article reviews this limited literature in an effort to describe the contemporary Canadian experience and compare the results obtained to date with public, private, and mixed systems of immunization program delivery.

STUDIES OF IMMUNIZATION DELIVERY IN CANADA

Vaccination Coverage and Quality Control

The immunization delivery system in British Columbia is approximately 80% public and 20% private. In 1981 the performance of the delivery system with regard to childhood immunizations was assessed in each of the province's health districts (4). Vaccination coverage, vaccine wastage rates, and adverse reactions were evaluated using the measures of (a) effectiveness (the index of unimmunized subjects, this being one minus the average rate of vaccination coverage against six vaccine-preventable diseases as ascertained upon entry to the first grade); (b) efficiency (as indicated

by the number of doses of polio vaccine distributed minus the number of vaccinated children); and (c) quality control, as indicated by the standard of adverse reaction reporting (adverse reaction reports per 10⁵ immunizations per annum).

Each indicator was assessed as a dependent variable against the percentage of vaccinations delivered by physicians in each health district. The degree of health district dependence on physicians ranged from 0% to 65%, with relatively greater dependence occurring in urban areas.

It was found that the effectiveness of vaccination coverage did not vary significantly with physician involvement, but physician delivery was associated with a greater degree of vaccine wastage. For example, a normal polio series at that time required a total of six doses. Where physician delivery accounted for 0% to 24% of immunizations, 9.1 doses were used per immunized child; in areas where physician delivery was 25% to 49%, 11.8 doses were used; and in areas where over 50% of the program was physician-based, 14.9 doses were used. Adverse reaction reporting was directly related to public health delivery (that is, the greater the degree of public health delivery, the better the standard of adverse reaction reporting).

Virtually no other accounts of vaccine wastage rates across Canada are available. One exception is a review of biological supply and vaccine utilization in Alberta during the summers of 1978 and 1979 (5). This review found that an estimated 80% of the biologicals then purchased and distributed for use in the province were actually administered, implying a low rate of vaccine wastage in this province's predominantly public delivery system.

Legislation Requiring Mandatory Immunization

New Brunswick, Ontario, and Manitoba have legislation requiring that children entering school be vaccinated against several vaccine-preventable diseases. Other provinces have maintained their voluntary immunization programs for children (since, it has been argued, they have achieved high compliance levels in the absence of legislation).

Ontario provides an interesting case study of the legislative approach. In this province, the public health services provide free vaccine for routine immunization. Most immunization, however, is performed in private physician's offices rather than at publicly-operated clinics. Following the introduction of legislation in 1982, a significant improvement occurred in the immunization of both elementary and secondary schoolchildren (6), as indicated by the following data:

Ontario immunization levels (%)		
	1983	1984
Grades K-6	92	95
Grades 7-8	83	92
Grades 9-12	53	87
Grade 13	39	69

It should also be noted, however, that the highest rates of coverage in recent years have been reported from Saskatchewan and Alberta, two provinces that rely almost exclusively on voluntary, publicly-delivered immunization programs and do not have school-entry legislation (7). Saskatchewan, with a population of one million, conducted a complete review of all childhood records for Grades 1-9 in 1982 and reported a 98% rate of measles immunization coverage for the province as a whole (8).

Immunization Record-keeping

Record-keeping is essential to an effective and efficient immunization program. In a 1979 brief to the National Immunization Policy Committee, the Canadian Medical Association voiced concern that few patients had personal, detailed records of their immunizations, and that, because of incomplete or non-existent immunization record transfers within and between provinces, a low level of immunization resulted (2).

At least two types of records (individual records and vaccinator records) are required. The individual records provide each individual with a personal record that can be reconstructed if necessary from the records of the vaccinator; and the vaccinator records, assuming they are effectively organized, provide a system for retrieving information on individual vaccination status.

In public delivery, access to these records can be facilitated by maintaining a centralized record system. In private delivery, ensuring such access is more difficult; but adequate record-keeping should be achieved at least through individual physician records. If a private system is to be given serious support by any provincial government, a centralized record system should be developed (9).

Vaccine Handling

There are numerous examples of vaccine efficacy in practice falling short of what would be expected on the basis of clinical trials. Vaccine failure may be due to poor handling practices (e.g., failure to store and transport under strict temperature controls). While good handling is easy to achieve at the level of the

manufacturer and provincial supply depots, vaccine distribution to local areas is subject to varying degrees of temperature control. Improper handling of vaccine may be a major problem. (For example, one study found that half of a group of pediatricians surveyed in Montreal did not store their vaccines properly—10.)

Compliance with Recommendations

A 1983 survey of children living in downtown Montreal was conducted to determine vaccination status with reference to the mode of vaccine delivery (11). There were 204 children in the sample, and 88% responded to the survey questionnaire. Thirty-nine percent of the respondents had been followed up in one of the well-baby clinics, while the other 61% had been followed up by private practitioners.

A study was made of the cumulative percentage distributions of children in both groups who had received vaccine, according to their age in months. Compliance with recommendations for DPT and MMR vaccination showed interesting variations. Among other things, the older the child when a particular vaccine was supposed to be given, the more likely it was that the vaccine had been given late; a small proportion of the vaccine doses were given early; and both kinds of deviations from the recommendations appeared to have been much more frequent in the private sector than in the public sector.

The issue of assuring compliance with immunization guidelines has been studied a great deal with regard to

influenza vaccination. This preventive measure has not been well accepted by many practicing physicians. It was found in one survey that only a small minority of the eligible patients were actually immunized, while the majority of those vaccinated under the age of 65 years received their vaccinations for reasons not consistent with national recommendations (12).

A study of compliance with recommendations for influenza immunization of chronically ill children was conducted in Halifax (13). The study population included children at a cystic fibrosis clinic and children with congenital heart disease. In the cystic fibrosis group, none of the children under five years of age had been immunized, all of those five through 14 years of age had been immunized, and percentages ranging from 50% to 63% of the children 15 through 20 years of age had been immunized. In the congenital heart disease group, the immunization rates varied from 7% to 57% and were inversely related to age (i.e., the youngest children generally had the highest rates of immunization).

All the locally-based family physicians of these two groups of children said they did not know whether their patients had received influenza immunization, and some said they would not immunize these patients unless advised to do so by the child's chest specialist. In a public immunization system, it seems reasonable to suppose that if high-risk children could be identified, then they might be more readily immunized.

Efforts to improve compliance have been made in both the public and private systems. In provinces with mixed systems, the public vaccination clinics tend to serve people with relatively low socioeconomic status. Typically, clinic patients who have missed appointments receive follow-up telephone calls, home

visits, or both. Physicians in private practice rarely follow up in this manner. (During an intensive month-long immunization promotion campaign in Alberta, local public health units were more effective than either physicians or public service television in contacting parents of young children—14).

A randomized trial in Ottawa tested three ways of reminding elderly patients in family practice settings to receive vaccine: personal reminder by the physician during a routine consultation; telephone reminder by the nurse; and reminder by letter (15). The overall vaccination rates for the three groups were significantly different (22.9%, 37%, and 35.1%, respectively). A control group receiving no reminder had a compliance rate of 9.8%. Overall, it was found that a telephone reminder by the nurse was the most productive and also the most cost-effective method. An important lesson of this study was that, in a system where the private physician delivers the vaccine, patient compliance may be greatly enhanced through active follow-up.

The cost-effectiveness of reminder letters has also been studied with regard to influenza immunization in Toronto, where a 43% acceptance rate was achieved (16, 17). When follow-up telephone calls were made to patients who had not responded to the letters, the coverage increased to 55%. However, under the fee-for-service reimbursement system prevailing in Ontario, neither reminder letters nor telephone calls proved to be cost-effective, nor did they result in net practice earnings. Among other things, the authors of this study concluded that there was a core of eligible patients who refused immunization in the belief that the risks of influenza vaccine outweighed its benefits—and that, for this reason, an improvement in the delivery system *per se* would be insufficient to raise immunization acceptance levels.

Immunization Delivery by Allied Health Professionals

Allied health professionals have been touted as effective substitutes for physicians in delivering immunizations. For example, one study examined potential expansion of the nurse's role in delivering preventive services at an outpatient clinic (18). To help resolve the conflicting demands of primary and secondary care, a program was developed whereby, with the physicians' agreement, nurses would select and vaccinate clinic patients eligible for influenza vaccination. In a controlled trial, the nurses offered vaccination to half of the eligible patients attending morning sessions and vaccinated 35% of them. In contrast, physicians in the afternoon sessions, who were unaware of the program, vaccinated only 2% of similar patients. These results showed that although these physicians agreed with the guidelines for influenza vaccination, they were not currently providing the service. The study found that use of nursing personnel to provide this and other types of primary medical care for clinic patients was a reasonable alternative (18).

Immunization Services for Travelers

A number of studies have been published on health advice to international travelers (19, 20). When sources of health information have been evaluated, it has been found that travel agencies often fail to provide timely and accurate information to the public. In addition, the knowledge of practicing physicians seems seriously deficient in the area of international immunization

requirements and health advice. It thus appears that public health agencies must assist travel agencies and physicians in locating more reliable international health information (19).

Through its involvement in the field of quarantine and immigration medicine, the Federal Department of National Health and Welfare is well-placed to communicate with local health agencies and with the public. Its role should be more actively developed, either for public service delivery of travel immunizations or for professional education of physicians charged with providing this service (20).

Other Considerations

Several other issues regarding immunization program delivery deserve systematic study. For example, the need for computerization in private physicians' offices or in the public sector is clear when one considers the logistics of issuing numerous reminder letters to clinic-based or community-based populations. It is also reasonable to ask about the quality of informed consent received in the private versus the public sector. (The public sector may have a more methodical approach to informed consent than do physicians in general, although there are no data to support this hypothesis.) In addition, the impact of new legislation requiring detailed informed consent for immunization in Ontario should be studied to determine its effect on vaccine acceptance.

DISCUSSION AND CONCLUSIONS

When the major issues associated with vaccine delivery are examined, it is clear that an immunization program requires commitment from all participants together with regular monitoring and evaluation. In Canada, several studies have indicated that childhood immunization levels are higher when vaccinations are delivered by a public system than when they are delivered by private physicians (4, 11).

Saskatchewan, with its dispersed population and lack of compulsory immunization, appears to have achieved the best overall success in protecting its population against vaccine-preventable diseases. The fact that virtually all of its immunizations are delivered through public clinics suggests that public delivery is a powerful positive factor in the Canadian context.

However, other provinces with public sector delivery systems have not fared so well. In the case of Alberta, a wrong public decision was made in the mid-1960s—a decision to continue using killed measles vaccine for four additional years after most of the country had switched to the live attenuated vaccine (7, 21). This example illustrates a key point about centralized public systems—that their use places a high premium on making the correct initial policy decision.

The relative cost of public sector versus private sector immunizations has not been studied well. It seems clear that family physicians can provide other primary care services at the time of immunization as part of a well-baby checkup or periodic health examination. On the other hand, public health clinics can be run efficiently and can vaccinate large numbers of children in a short period of time. They also afford an oppor-

tunity to carry out preventive intervention and counseling on primary care issues related to child safety, nutrition, and dental care; and, in general, the cost of public health nursing is far less than the cost of physician time.

Regarding the quality and completeness of vaccination records, not all provinces currently require that a record be filled out for every immunization. Record-keeping is a mandatory part of the compulsory immunization programs of the provinces of New Brunswick, Ontario, and Manitoba, but it is not clear to what extent records management is stressed across the country.

When one examines the differences in the immunization levels of provinces with compulsory immunization legislation and those without, there is no clear evidence favoring one approach over the other in Canada. In the case of children who move between jurisdictions, however, the public system does appear to have a greater capacity to transfer records and complete immunization series in an efficient and timely manner.

Available data indicate that public sector delivery systems tend to report more adverse effects than do private sector delivery systems, a finding suggesting that public delivery systems more adequately address the issues of quality control and accountability (4). It could also be that the approach to informed consent is superior in the public sector, although this is a matter that still needs to be investigated.

Inappropriate vaccine storage, handling, and wastage are potentially serious problems (10), especially when one considers the numerous refrigerators in

tiny clinics throughout the country. Indeed, many people are in fact vaccinated with agents rendered ineffective due to poor handling, as revealed by the low vaccine efficacy figures reported in a number of outbreaks (10, 22). Further professional education is required to assure that vaccines are stored and handled in an appropriate manner and that wastage is minimized. In general, public systems would appear likely to afford more effective control of vaccine handling than private or mixed systems.

Our opinion, based on the limited information reviewed, is that public immunization systems in Canada have tended to deliver the highest overall quality of service. Such systems, if properly developed and maintained, should theoretically offer advantages with regard to accountability, standardization of procedures, vaccine handling practices, manpower utilization, records management, cost, ease of program evaluation, and levels of coverage. We also feel that the challenge for every province at present is to develop and maintain immunization programs that are comprehensive and meet today's standards for effectiveness, efficiency, and quality control. These are the criteria that should be used to judge the performance of all provincial programs, regardless of whether they are public, private, or mixed.

SUMMARY

Canadian immunization services, which fall primarily within provincial or territorial jurisdictions, can be classified according to whether immunizations are generally provided by public programs, private physicians, or a combination of the two. This article reviews the very limited literature available on this subject in an effort to describe Canada's recent experience and compare the

results yielded by public, private, and mixed systems.

The existing data suggest somewhat higher levels of vaccine wastage in areas where over 25% of the immunizations are provided by private physicians. They also indicate that improved coverage has been produced by legislation requiring school entrants to be vaccinated—at least in the province of Ontario, where most immunizations are administered by private physicians. The highest levels of coverage, however, have been recorded in the provinces of Alberta and Saskatchewan, where almost all vaccinations are delivered by public programs and where vaccination for school entry is not required.

Compliance with existing recommendations for DPT and MMR vaccination was assessed by a 1983 survey of vaccinated children in Montreal. The results suggested that the frequency of vaccinations administered earlier or later than recommended was higher in the private than in the public sector.

On the basis of these and a variety of other studies and arguments dealing with related matters, the authors suggest that public immunization services, if properly developed and maintained, offer theoretical advantages over private services with respect to accountability, standardization of procedures, vaccine handling practices, manpower utilization, records management, cost, ease of program evaluation, and levels of coverage. They also note that the challenge for each of Canada's provinces in general is to develop and maintain immunization programs that are comprehensive and that meet today's standards

for effectiveness, efficiency, and quality control—irrespective of whether the specific programs involved are public, private, or mixed.

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Symposium Held on Refugee Health

Georgetown University Medical Center in Washington, D.C., hosted an international symposium on "Health Care for Displaced Persons and Refugees" from 4 to 7 December 1988. Co-sponsoring organizations included the Pan American Health Organization and World Health Organization, as well as other United Nations specialized agencies, U.S. Government offices with responsibilities related to refugees and health, and the League of Red Cross and Red Crescent Societies.

The symposium brought health care providers together with research and public health experts to address major areas of uncertainty and controversy with regard to caring for refugees in both developing and developed countries. Topics included progress in disease therapy, health care delivery in the Third World, health care for resettled refugees, and ethical dilemmas in refugee relief. The proceedings of the meeting will be published in early 1989.