Measuring Hepatitis B Uptake in a New Universal Infant Program

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ABSTRACT

Background: Vancouver-Richmond Health Board has the highest reported rate of hepatitis B in Canada, including an annual average of 25 cases in children under 12 years of age, based on reports from 1994-1997 inclusive. The current provincial adolescent grade-six hepatitis B immunization program does not protect against childhood infection. The regional health board implemented universal infant hepatitis B immunization in September 1998.

Method: Immunization coverage data were obtained on a random sample of 191 infants born in March 1999 one year after initiation of the program.

Results: By eight months of age, 97.9% of children had received some vaccinations. 73.8% of infants had received three doses of hepatitis B vaccine and 12.6% had received two doses. In comparison, 89% had received three doses and 7.9% two doses of DTP-Hib vaccine. 13.1% of infants had not received any hepatitis B vaccine. For a majority (67%) of these children, their physician's lack of awareness or lack of acceptance of the program constituted the reason for no hepatitis B vaccine uptake. Only one parent cited adverse publicity as the reason for refusing vaccination.

Interpretation: This survey reveals a successful first year of the program without harm to the pre-existing childhood vaccination programs. Hepatitis B vaccine uptake can be improved by increased awareness among physicians and parents.

Hepatitis B virus (HBV) causes a serious infection often leading to acute or chronic hepatitis, liver cirrhosis, liver cancer or death.¹ Infected infants have a 90% risk of developing chronic HBV infection due to their inability to clear the HBV.² Of those with chronic infection, 25-30% will die due to HBV-related complications. An immunization program aimed at infants has proven to reduce both the incidence of HBV infection and its complications. A 50% reduction in childhood hepatocellular carcinoma has been documented in Taiwan within 10 years of implementation of a universal infant immunization program.^{3,4}

In 1992, the Canadian Paediatric Society recommended a universal HBV vaccination program aimed at infants.¹ A program synchronized with the existing childhood vaccination program was considered to be the most cost effective and easiest to implement among the various schedule options. The same year, British Columbia became one of the first provinces to implement a universal HBV immunization program aimed at adolescents. The goals of the provincial HBV immunization program are both to prevent transmission of HBV and to prevent acute and chronic disease due to HBV.

Vancouver/Richmond Health Board (VRHB) has the highest reported rate of newly identified HBV in Canada at 255/100,000 (1997 reported rate). This rate is eight times the rate in the rest of the province. Factors which may account for this difference include large populations of high-risk groups such as immigrants from countries where hepatitis B is endemic, gay and bisexual men and injection drug users. This region also accounts for 60% of all infections reported in BC for children under 12 years of age. The actual numbers of HBV infections may be 10 times greater than the reported rate due to the presence of mild, unrecognized or asymptomatic infections in most children and, to a lesser degree, in adults.⁵

This program was started in September 1998 due to concerns of HBV infection in children currently unprotected by the provincial program. From 1992-1997 inclusive, an average of 25 cases of hepatitis B were reported per year in children under 12 years of age, and many more unrecognized infections likely occurred. HBV vaccine was added to the infant

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immunization schedule at 2, 4 and 6 months of age, to be given concurrently with the DPTP-Hib vaccine. All children receiving immunization services in Vancouver/Richmond are eligible for this program. High-risk infants born to carrier mothers are eligible for the HBV prophylaxis (hepatitis B immune globulin and vaccine) at birth and are thus excluded from this program.

The short-term objective of this program is to provide HBV vaccine to all infants born in Vancouver and Richmond. The long-term objective is to decrease the burden of illness due to HBV in children under 11 years of age. This program was introduced to the public and physicians by a press release to various local media. Physicians received HBV programmatic details via numerous avenues: fax or mail-outs were sent by VRHB to all the doctors practicing in the area, and pamphlet bag stuffers along with HBV vaccine samples were placed with routine orders of DPTP-Hib vaccine during the first four months of the program.

Similar universal infant HBV immunization programs have been operating in the United States for some time. VRHB became the second Canadian region, after the province of New Brunswick, to start this infant program. Other Canadian provinces and territories (North West Territories, Yukon, and British Columbia) have followed suit.

This study was undertaken to evaluate the acceptance of this new program by parents and physicians in the health region. The primary objective was to determine uptake of the HBV vaccine in eligible infants, and reasons for inadequate uptake. The secondary objective of the study was to ensure that the DPTP-Hib coverage had been maintained in the presence of this new program. Evaluation of vaccine uptake was undertaken one year post program implementation.

METHODS

The Vancouver/Richmond Health Board maintains a registry on all new births in its region through birth notifications sent by hospitals. The 1998 birth cohort was 7,200 infants. A random sample of infants born in March 1999 in the region was obtained from this registry. Parents of these infants

TABLE I
Vaccine Uptake

	DPTP-Hib Uptake (%)	HBV Vaccine Uptake (%)
Three doses	89.0	73.8
Two doses	7.9	12.6
One dose	1.0	0.5
None	2.1	13.1
Total (n)	100.0% (191)	100.0% (191)

were contacted by phone in November 1999, when the infants were eight months old. By this age, children following the routine schedule should have received three doses of DPTP-Hib and three doses of HBV vaccine (i.e., one dose of each at 2, 4, and 6 months of age). Vaccine uptake information was retrieved from Health Passport records held by parents, or from the child's physician if parents did not have the record. Information was sought on choice of vaccine provider, awareness of HBV program, reasons for separate vaccine schedule (if doses of DPTP-Hib and HBV were given at different visits) and missed doses, and reasons for lack of vaccine uptake.

Sample size calculations were aimed at 90% power of detecting a 10% difference in the uptake of the new vaccine program and the known provincial DPTP-Hib 3 uptake of 85%.^{6,7} 199 children were needed for this survey.

The data were analyzed using SPSS 9.0.

RESULTS

A total of 255 births were investigated. Of these infants, we were unable to trace 36 children (families), 14 families refused to provide the immunization data, 6 children were cared for by physicians outside of VRHB, and 1 death was recorded. Immunization data were collected on 198 children. Most of the data were retrieved from physicians' records rather than Health Passports. Of this cohort, 7 high-risk children received HBV prophylaxis at birth and were thus ineligible for the new 2, 4, 6 month infant HBV immunization program. The following results pertain to 191 infants.

77.5% of the infants were residing in Vancouver, 18.8% in Richmond, and 7 infants (3.7%) in the study were from areas adjacent to the health region. 55.5% of infants were male, 44% were female.

55.0% of parents reported awareness of the new infant HBV immunization program. Of this group, 55.2% had heard from their child's physician, while 13.3% cited

the public health nurse as their source. No one cited the VRHB newborn telephone line as a source of HBV information.

97.9% of children had at least one dose of routine childhood vaccines (DPTP-Hib) while 2.1% (n=4) of children did not receive any vaccines. The parents of these children were conscientious objectors. Of the 562 vaccine doses delivered, 89% were delivered by family physicians, 4.1% by pediatricians, and 6.9% by public health nurses.

The HBV vaccine coverage was 73.8% for the complete series, 12.5% for two doses, and 0.5% for one dose. The coverage of DPTP-Hib was 89.0% for the three doses, 7.9% for two doses, and 1.0% for one dose. 13.1% of the children had not received any HBV vaccine, while 2.1% of children had not received the DPTP-Hib vaccine. (See Tables I and II.)

Of the children who received both HBV and DPTP-Hib vaccines, only 9.5% (n=16) received the two vaccines on separate dates. Physician factors were responsible for 10 of these 16 cases. These factors included use of another schedule for HBV vaccine delivery (e.g., 0, 1, and 6 months) in 5 cases, physician's concern regarding too many shots per visit in 4 cases, and vaccine not available at physician's office in 1 case.

There were 21 children (11%) with some DPTP-Hib coverage and no HBV vaccine uptake. Lack of HBV program awareness on the part of the physician accounted for almost half of these children (n=11). In 6 cases, either the physicians or parents felt that the infants were not at risk of acquiring the HBV infection. Three parents did not support the program either due to concern regarding possible adverse effects of vaccine or due to adverse media publicity (n=1). One parent deferred the vaccination to the grade six program.

DISCUSSION

VRHB has a diverse, multi-ethnic population. 45% of residents self-identify with

TABLE II
Combination Vaccine Uptake

	DPTP-Hib (3)	DPTP-Hib (2)	DPTP-Hib (1)	DPTP-Hib (0)
HBV Vaccine (3)	73.8%	—	—	—
HBV Vaccine (2)	7.3%	5.2%	—	—
HBV Vaccine (1)	—	—	0.5%	—
HBV Vaccine (0)	7.9%	2.6%	0.5%	2.1%

* number of vaccine doses are enclosed in brackets.

membership in a visible minority group. Chinese/East Asian is the largest group accounting for 36% of VRHB population, followed by South Asians at 5%.⁸ An unknown proportion of this population is foreign-born. It is also unclear whether the reported infections in children under 12 years of age could have been prevented by this universal infant HBV vaccination program, due to lack of enhanced surveillance data to resolve this issue. However, studies have demonstrated that North American-born children of Southeast Asian immigrants are at risk of both perinatal and horizontal transmission of HBV from parents, siblings or other carriers in their community.^{9,10}

This study demonstrates a strong provider and public acceptance of the new HBV vaccination program and the basic childhood vaccination program as evaluated by vaccine uptake. The birth cohort had an excellent uptake of HBV vaccine with 86.4% of children having received two or more doses of the vaccine by eight months of age. As two doses of HBV vaccine are protective in >95% of recipients, this represents a high level of population protection.^{11,12} 89% of the children had received their three doses of DPTP-Hib by eight months while another 7.9% had received two doses of the same vaccine. Only 2.1% of the children in the survey had not received any vaccinations due to a conscious preference by their parents.

Overall, 11% of children had received some of their scheduled DPTP-Hib vaccine but no HBV vaccine. Main factors for discordance in the two vaccine schedules and inadequate HBV uptake were physician-related issues. For the children who did not receive any HBV vaccine, half the parents reported that they or their physician were not aware of the program. Since this is a physician/public health delivered program, the responsibility for awareness largely resides with public health. 86.9% of children had at least one dose of the HBV vaccine, while only 55% of parents reported awareness of this new program. This

demonstrates the implicit faith of the parents in accepting public health recommendations as implemented by physicians for protecting the health of their children. Thus, public health should make greater efforts to reach and educate physicians both at the introduction of a new program, and in its early stages of implementation.

This study also documents missed public health opportunities in raising parental awareness about the new vaccine program. All parents in VRHB receive a visit or a phone call from a public health nurse within days of the birth of their child. Only 13% of parents who were aware of the HBV program mentioned receiving this information from the public health nurse. However, 93% of the vaccine doses are physician-delivered. Thus, parents are more likely to remember receiving the program information from physicians than from public health. Recall bias may be responsible for some of this result as well.

One main limitation of this study is the inability to compare the immunization patterns of the survey non-responders and responders. 22% of the children could not be located or their parents refused to participate in this survey. Some of the non-responders were Asian women who delivered their babies in Vancouver/Richmond and returned home soon afterwards. Unfortunately these data were not captured at the time of enrollment. It is thus difficult to differentiate the proportion of our cohort who would be affected by this practice, versus those who may be either lost to follow-up or who refuse to participate for the usual reasons. This latter group may constitute a high-risk population of mobile individuals and/or non-acceptors of immunizations. Of note are the results of other local studies that have examined DPTP-Hib coverage of children enrolled by a number of mechanisms and have found similar coverage rates to our study.^{6,7} Thus, it is likely that our results can be generalized to the whole of the health region.

A possible adverse effect of a routine infant HBV immunization program would be inappropriate treatment of neonates at high risk for HBV infection, such as those born to HBV-carrier mothers. This study did not have the sample size appropriate to address this issue. However, seven infants contacted originally in the sampling process were high-risk infants. A review of their vaccination status revealed that they were treated appropriately at birth.

This study was aimed at examining parental opinions and acceptance of this new program. Provider and parent's lack of awareness was the most common cause for children not receiving the HBV vaccine. This may reflect the delay in dissemination of new program information to doctors, and needs to be addressed in a systematic fashion. It is important to emphasize the high level of public acceptance for immunizations when recommended by physicians and public health in a Canadian context.

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RÉSUMÉ

Contexte : Le conseil de santé de Vancouver-Richmond déclare le plus haut taux d'hépatite B au Canada, notamment une moyenne annuelle de 25 cas chez les enfants de moins de 12 ans selon les rapports de 1994 à 1997 inclusivement. Le programme de vaccination contre l'hépatite B en vigueur dans la province pour les adolescents de sixième année n'offre aucune protection contre l'infection durant l'enfance. Le conseil de santé régional a mis en œuvre un programme universel de vaccination des nourrissons contre l'hépatite B en septembre 1998.

Méthode : Obtention de données sur la couverture vaccinale à partir d'un échantillon aléatoire de 191 nourrissons nés en mars 1999, un an après le début du programme.

Résultats : À huit mois, 97,9 % des enfants avaient reçu certains vaccins : 73,8 % des nourrissons avaient reçu trois doses du vaccin contre l'hépatite B, et 12,6 % en avaient reçu deux doses (à titre de comparaison, 89 % avaient reçu trois doses et 7,9 % avaient reçu deux doses du vaccin contre DPTp-HIB); 13,1 % des nourrissons n'avaient pas été vaccinés contre l'hépatite B. Pour la majorité (67 %) des enfants non vaccinés contre l'hépatite B, c'est le médecin qui ignorait l'existence du programme ou n'y adhérait pas. Un seul parent a dit avoir refusé le vaccin parce qu'il avait mauvaise presse.

Interprétation : Le sondage indique que la première année du programme a été fructueuse et n'a causé aucun tort aux programmes préexistants de vaccination des enfants. L'acceptation du vaccin contre l'hépatite B peut être améliorée par une sensibilisation accrue des médecins et des parents.

Recension Book Review

Benoît Gaumer et Georges Desrosiers. *Jules Gilbert : Pionnier de l'éducation sanitaire*.

Célébrités/Collection biographique. Lidec, Montréal, 2001.

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C'est un fort bel ouvrage que Gaumer et Desrosiers viennent de donner à la santé publique pour ne rien dire du splendide service rendu au mémorial collectif de la discipline. Jules Gilbert a été un des tous premiers grands artisans de la santé publique du Québec et si sa mémoire reste surtout liée au domaine de l'éducation pour la santé, il aura été le modèle complet du spécialiste de santé publique qui a tant fait pour l'amélioration de la santé de l'humanité.

Les auteurs font clairement ressortir à quel point la carrière de Jules Gilbert a été marquée par la généralisation du modèle des unités sanitaires à travers les régions rurales du Québec, qui ne jouissaient pas des avantages que procuraient aux citoyens des grandes villes, les bureaux municipaux de santé. Ce faisant, l'histoire qu'ils reconstituent d'un personnage qui est immense comme sa confiance dans la justesse de son œuvre, fournira à tous ceux qui amorcent leur carrière dans l'un ou l'autre des domaines de la santé publique, le rappel d'un certain nombre de principes qu'il ne faut jamais perdre de vue. Et aussi la réitération qu'il n'y a rien de neuf sous le soleil. Les affres qu'auront valu à Gilbert ses positions sans

équivoque sur la nécessité de la pasteurisation du lait ne sont pas différentes de celles qui s'abattent sur les contemporains qui s'inquiètent de la veulerie face à certaines expositions que ce soit en milieu de travail, ou bien un peu partout ailleurs comme dans le cas de la fumée de tabac des autres.

L'ouvrage, d'une facture typographique soignée, comporte huit chapitres dont la lecture est agrémentée d'illustrations qui marquent la vitesse avec laquelle les époques se succèdent. La vie même de Jules Gilbert donne l'impression qu'entre le village du Lac St-Jean où il a commencé sa carrière et l'École d'hygiène de l'Université de Montréal dont il fut de la toute première équipe de fondateurs, c'est un siècle, plutôt que 43 années, qui s'est écoulé. La modernité de ses conceptions sur la manière correcte de disséminer l'information pour assurer la protection de la santé acquiert, au voisinage des idées bien pensantes marquant l'époque, une démesure qui laisse deviner ce que dut être l'ahurissement de bien de ses contemporains quand il leur était donné de devoir frayer avec le docteur Gilbert. Cette bien brève histoire est une lecture qu'il faut recommander à tous les jeunes qui ont moins de soixante ans. Et un grand merci à Desrosiers et Gaumer.

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