

Varicella Vaccine

Factors Influencing Uptake

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ABSTRACT

Background: In Canada, varicella vaccine is recommended but its uptake has been low. In contrast to most other recommended paediatric vaccines, this one is not currently provided free of charge in all provinces and territories in Canada.

Objective: To evaluate the rate of health care provider offer of varicella vaccine to parents and the most important determinants of parental decision to accept the offer.

Methods: A structured questionnaire was administered by phone interview to parents of children aged 14 to 17 months in the Quebec City area where the vaccine is not publicly funded.

Results: Among the 477 participants, 37% had been offered the vaccine by their health care provider: 45% when the provider was a paediatrician and 29% for general practitioners or public health clinics. Only 13% of offers included information on the risk of varicella complications, the cost, efficacy and safety of the vaccine. By decreasing order of importance, the factors that positively increased parental decision to use varicella vaccine included: information on vaccine safety, a positive recommendation and a higher family income.

Conclusion: Despite a recommendation for universal vaccination, varicella vaccine is not broadly offered and few offers contain all the information both needed to elicit proper consent and correlated with a positive uptake.

La traduction du résumé se trouve à la fin de l'article.

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In May 1999, the National Committee on Immunization (NACI) recommended vaccination against varicella of all persons 12 months of age and older who are susceptible to the virus.¹ Varicella vaccine is not currently provided free of charge in most Canadian jurisdictions and parents are obliged to pay approximately \$80 CDN to have their child vaccinated.

A survey conducted in Quebec City found that >50% of parents of 2-year-old children are interested in this vaccine.² Just before the vaccine was licenced in December 1998, 94% of parents of 9-month-old infants said they were interested in the vaccine when they were informed of the complications of the disease and 50% would accept having to pay for the vaccine.³ In spite of these results, only 4% of 12-month-old children living in the Quebec City area were vaccinated against varicella during the 12 months following publication of the NACI recommendation.³

The objectives of this study were to estimate the proportion of parents who were offered vaccine by their health care provider, to describe the elements of information included to support the offer, to assess the main reasons why some parents refused to have their child vaccinated and to determine the factors influencing the uptake of varicella vaccine.

METHODS

Children were identified from the regional immunization registry which includes almost every (>98%) child, vaccinated or not and living in the Quebec City area, as the source of inclusion is live birth notifications. The registry had 1,330 children aged from 14 to 17 months (born between April 30 and July 31, 1999). This age was selected because children should have had their 12-month visit for MMR vaccination, at which point children were also eligible for varicella vaccination. A total of 893 children were targeted for the study. This included all 465 who were predominantly vaccinated by a nurse in a public health clinic or by a general practitioner, and an equivalent number (428) of children chosen at random among the 734 vaccinated by a paediatrician.

Data were collected between July and October 2000 by phone interview. After

obtaining verbal consent, the interviewer collected data on socioeconomic and demographic factors; number of children in the family and their previous experience with varicella; parental perception of the severity of varicella; opinion about vaccination in general; whether parents had been offered varicella vaccine for their child by their usual vaccine provider, the information included in this offer (the safety of the vaccine, the complication of varicella, the provider's positive recommendation); whether the child had been vaccinated; and if not, the reason(s) for this refusal. The vaccination status was assessed only by parental response. For those not offered the vaccine, we assessed the impact of information on cost and varicella vaccination on the intention to have their child vaccinated.

Proportions were compared with χ^2 test or Fisher's exact test. Trends were assessed with Mantel-Haenszel χ^2_{trend} test. Multivariate analysis for vaccination status in children offered the vaccine was performed with logistic regression and included only participants for whom all information was provided. The model included the information presented in the vaccine offer, the household income, the perception of the severity of varicella and the maternal age. The importance of the variables was calculated by reporting the Wald's χ^2 on 100.

This study has been approved by the Ethics Committee of the Centre Hospitalier Universitaire de Québec (CHUQ) pavillon CHUL.

RESULTS

Overall, 74% (663/893) of the parents were successfully contacted; 87.3% (579) agreed to participate, for an overall participation rate of 65%. Of these, 102 were excluded, leaving 477 participants: 246 children vaccinated by a paediatrician, 151 by a general practitioner and 80 by a public health nurse. The demographic characteristics of household were similar with the three types of providers. The mother was the respondent 84% of the time.

Offer of vaccine

Overall, 90% of the parents perceived varicella as a benign or moderate disease.

TABLE I

Vaccine Offer According to the Parents' Characteristics

		N	% Reportedly Offered the Vaccine	P-Value
Household income	<\$20,000 CDN	37	22%	0.005
	\$20,000-39,999 CDN	113	28%	
	\$40,000-59,999 CDN	145	36%	
	≥\$60,000 CDN	142	46%	
	Unknown	40	50%	
Mother's age*	<26 years	80	30%	0.30
	26-35	312	39%	
	≥36 years	83	37%	
Mother's education	<13 years	169	27%	<0.001
	≥13 years	308	43%	
Number of children	1	239	32%	0.07
	2	174	43%	
	≥ 3	64	42%	
Type of provider	Paediatrician	246	45%	<0.001
	GP or public health nurse	151	34%	
	Public health nurse	80	20%	

* 2 unknown

TABLE II

Information Provided by the Vaccinator During the Varicella Vaccine Offer as Reported by Parents

Information Provided	Total N = 178 %	Paediatrician N = 110 %	GP/PH Nurses N = 68 %	P-Value
Varicella complication	44	39	53	0.06
Varicella vaccine efficacy	51	55	44	0.40
Varicella vaccine safety	39	43	32	0.17
Varicella vaccine cost	73	72	75	0.59
Vaccinator recommendation	59	60	57	0.72
All the above including the vaccinator recommendation	13	13	15	0.71
All the above without the vaccinator recommendation	3	3	4	0.55

TABLE III

Proportion of Children Vaccinated According to the Information Reportedly Provided by their Vaccinator*

		N	% Vaccinated	P-Value
Varicella complication	Provided	79	38	0.17
	Not provided	86	28	
Varicella vaccine efficacy	Provided	91	45	< 0.001
	Not provided	79	19	
Varicella vaccine safety	Provided	69	64	< 0.001
	Not provided	97	12	
Varicella vaccine cost	Provided	130	38	0.05
	Not provided	46	22	
Vaccinator recommendation	Provided	105	45	< 0.001
	Not provided	69	16	

* While 178 children were reportedly offered the vaccine, the total number of respondents differs because some did not answer some questions.

TABLE IV

Odds Ratio (OR) of the Variables Influencing Parental Decision Related to Varicella Vaccine With and Without Vaccine Safety Information in Multivariate Analysis

	Odds Ratio [Confidence Interval 95%]
Varicella vaccine safety	12.8 [4.9 – 33.8]
Vaccinator's recommendation	2.83 [1.2 – 6.8]
Family's income	Ref.
	≥\$60,000 CDN

The existence of a varicella vaccine was known by 66% of the parents. Only 37% reported being offered the vaccine by their usual vaccine provider: 45% when the provider was a paediatrician and 29% for

general practitioners or public health nurses ($p=0.004$) (Table I). The proportion offered the vaccine increased significantly from 22% to 46% for those with higher income and from 27% to 43%

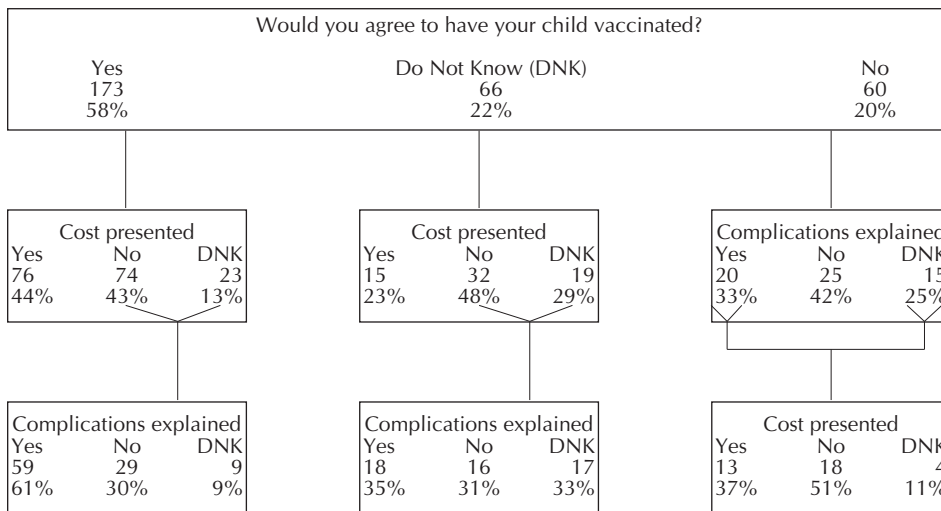


Figure 1. Parental decision according to information on varicella complications and vaccine cost among the 299 parents who were not reportedly offered varicella vaccine by their child's vaccine provider.

with higher maternal education. The vaccine was slightly less frequently offered to parents with a single child than to those with 2 or more. Paediatricians offered the vaccine more often than general practitioners, who themselves did so more often than public health nurses. In multivariate analysis, the likelihood of varicella vaccine offer was greater for parents with an income greater than \$40,000 CDN (OR=1.4, 0.90-2.3), with maternal education ≥ 13 years (OR=1.8, 1.1-1.8) and if the provider was a paediatrician (overall OR=1.8, 1.3-2.8; 1.4 and 3.2 compared to GP and public health nurse, respectively).

The information content accompanying the offer of vaccine was similar between the different types of providers (Table II). According to parents' reports, only 13% of the offers contained all the information items related to the disease (complications) or the vaccine (efficacy, safety and cost).

Parents reportedly offered the vaccine by their provider

Among the 178 children offered the vaccine, 33% (59) were vaccinated. The vaccination rate increased with older age of the mother ($p=0.01$) or the father ($p=0.05$), or higher income ($p=0.02$), but was not statistically different for types of provider (paediatrician: 36%, general practitioner: 29%, public health nurse: 25%, $p=0.19$). It also increased if the vaccinator discussed information related to

vaccine efficacy, safety or cost, or with provider's recommendation (Table III). The vaccination rate increased from 12% with no recommendation from the provider, to 21%, 31% and 57% with a weak, moderate or strong recommendation, respectively ($p<0.001$). In multivariate analysis, only information of vaccine safety, vaccinator's recommendation and the household income were significantly associated with higher vaccination rate (Table IV). The variable related to vaccine safety explained 63% of the variance, the vaccinator's recommendation 13%, and the household income 8%.

The four main reasons given by parents in response to an open-ended question as to why they refused to vaccinate their child were: complications of the disease were not frequent enough (39%), or were not serious enough (32%), vaccine was too expensive (39%), and weak vaccinator's recommendation (35%).

Parents reportedly not offered the vaccine by their provider

Among the 299 parents who reported they had not been offered the vaccine, 58% (173) indicated that they would be interested in the vaccine (Figure 1). Of these, 43% (74) became uninterested when given the vaccine price (\$80). The probability that they would continue to want the vaccine was higher if the household income was over \$60,000 CDN (OR: 2.8, 1.3-6.3). Among the 97 who

became uninterested or did not know after being presented the vaccine cost, 61% (59) became interested again when the risk of varicella complications and the vaccine efficacy were presented as described in the NACI statement: i.e., about half of the cases consult a physician, 2% develop a skin infection which requires an antibiotic, 1/500 is hospitalized, 1/50,000 develops serious neurological complications, 5/100,000 develop flesh-eating disease (invasive *Streptococcus pyogenes* β haemolyticus group A (IS β HGA)) – a rate 40 to 60 times greater than normal, and 1 to 3 children per 100,000 die of varicella.¹

Among the 60 (20%) who were not initially interested, 33% (20) became interested when the varicella complications and the vaccine efficacy were explained, and an additional 25% (15) did not know. The probability to become favourable was lower if one of their children had already had varicella (OR: 0.39, 0.1-1.2) and with higher maternal education. Subsequent to the vaccine cost presentation, only 37% (13/(20+15)) remained favourable.

The proportion of parents interested by the vaccine ranged from 30% to 76%, depending on the information they were given. When information on the potential complications of varicella was given in the absence of cost information, 76% of parents were in favour of the vaccine. However, when information on cost was presented without information on complications, 30% of the parents were in favour of the vaccine. Finally, 61% of the parents were in favour of the vaccine when given information both on cost and complications.

DISCUSSION

This study shows that even 18 months after Canada licenced its varicella vaccine, and more than a year after its recommendation by the NACI, only 37% of parents with a child in the vaccine-recommended age group reported that they had been offered the vaccine. This suggests that vaccinators are not yet strong supporters of the vaccine. As observed elsewhere,^{2,4,5} paediatricians are more supportive, proposing the vaccine 1.4 times as often as general practitioners and 3.2 times more often than public health nurses. This greater support is probably because

paediatricians more frequently see varicella complications than others.⁶ However, the paediatricians' support is far from complete as only 48% of parents who met a paediatrician for their child's 12-month MMR visit recall being offered the vaccine, a result also in line with other studies.^{2,5}

This study is based on parental recall, which is not fully reliable. The recall bias may underestimate the number of parents who in fact had been offered the vaccine, as well as the number of parents who had been given information on the disease and the vaccine. Parents who had their child vaccinated may be more likely to recall the offer than those who chose not to have their child vaccinated. However, this bias may not be strong given that the interviews were conducted 2 to 6 months after their visit for MMR vaccination. While the information given by the vaccinators was not standardized and may have biased our results in parents offered the vaccine, they are pointing in the same direction as the results from parents reportedly not offered the vaccine who were all given the same information.

Among parents offered the vaccine by their provider, information about the risk of varicella complications increased the proportion vaccinated (38% vs 28%) but this did not reach statistical significance ($p=0.17$). Among those who were not offered the vaccine by their provider but were questioned by our interviewers, the impact of this information was higher, with one third of those initially not interested in the vaccine becoming interested when given the information. It is likely that the list of complications

presented by our interviewers was more extensive than that presented by the vaccinator and may have had a greater impact. As varicella is perceived by 90% of the parents as a benign or moderate disease, information about its complications may not completely change this perception.

Safety of the vaccine was the most important factor influencing parental decision to vaccinate. However, as previously observed,³ the cost of the vaccine had a negative impact on its use. This varied according to household income, and cost was the second most frequently mentioned reason for parent refusal to vaccinate their child. The preferential offer of vaccine to more affluent or more educated parents (Table I) raises a question of equity that needs to be addressed.

RÉSUMÉ

Introduction : Au Canada, le vaccin contre la varicelle est recommandé, mais la couverture vaccinale est faible. À la différence de la plupart des autres vaccins pédiatriques recommandés, ce vaccin n'est pas actuellement offert gratuitement dans toutes les provinces et territoires du Canada.

Objectif : L'objectif de cette étude était d'évaluer la proportion de parents s'étant fait offrir ce vaccin par leur vaccinateur et de déterminer les facteurs les plus importants dans la décision parentale d'accepter une telle offre.

Méthode : Lors d'entrevues téléphoniques, un questionnaire standardisé a été administré aux parents d'enfants âgés de 14 à 17 mois de la région de Québec, où le vaccin n'est pas payé par un programme public.

Résultats : Parmi les 477 participants, 37 % s'étaient fait offrir le vaccin par leur vaccinateur : 45 % lorsqu'il s'agissait d'un pédiatre et 29 % pour les omnipraticiens ou dans les cliniques publiques. Seulement 13 % des offres présentaient des informations sur les risques de complications de la varicelle, le coût, l'efficacité et l'innocuité du vaccin. En ordre décroissant d'importance, les facteurs qui favorisaient la décision des parents de faire vacciner leur enfant contre la varicelle étaient : l'information sur l'innocuité du vaccin, une forte recommandation du vaccinateur et un revenu familial relativement élevé.

Conclusion : Malgré une recommandation de vaccination universelle, le vaccin contre la varicelle n'est pas largement offert, et peu d'offres présentent toutes les informations nécessaires pour obtenir un consentement éclairé et qui sont associées à un meilleur taux de vaccination.

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