

Evaluation of a population-based prevention program against influenza among Swiss elderly people

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Summary

Introduction: Influenza is a major cause of morbidity and mortality and occurs in epidemics in the winter. This study is an evaluation of a population-based prevention program against Influenza, implemented during autumn 2000 by the Health Department of the Canton of Vaud.

Methods: A pre-intervention/post-intervention design was used. In June 2000 and March 2001, 4007 questionnaires were sent to two different stratified random samples of people aged 65 and over living in the Canton of Vaud, Switzerland. Univariate, bivariate and multivariate analyses were performed.

Results: Vaccination coverage among people older than 65 was 58.0% in 1999 (95% CI: 56.2%–59.8%) and 58.4% (95% CI: 56.6%–60.2%) in 2000. A 6.5% significant increase in vaccination coverage was seen in the group of people aged 65 to 69 ($p = 0.008$). In the pre-intervention survey

immunisation rates were 22.6% among people who had not consulted a physician, 59.2% among those who had consulted a physician once, and 73.2% among those who consulted twice or more ($p = 0.001$). These rates were respectively 30.8%, 58.0% and 75.1% ($p = 0.001$) in the post-intervention survey.

Conclusions: No global increase in Influenza vaccination coverage in the elderly population could be observed following a community based intervention in a Swiss Canton. However, the enhanced vaccination rates noted in the 65–69 years old group and in people who did not receive medical care are compatible with an effect of the campaign. Further increase in vaccination coverage may be obtained by diversification and repetition of such promotion campaigns.

Key words: influenza; immunisation; prevention program

Introduction

Influenza epidemics continue to be a major cause of excessive winter morbidity and mortality, particularly in elderly individuals. Immunisation against influenza has been shown to be effective in reducing serious complications in high-risk patients [1–3]. In addition, it is well established that influenza vaccination is a cost effective measure [4–8]. During the 1999–2000 epidemic, 447 suspected cases of influenza were reported in Switzerland by the Swiss Sentinel Surveillance Network [9]. The National Influenza Centre received 653 samples during the same epidemic, of which 26% were confirmed to be influenza A. This figure rose to as much as 46% among people over 70 years of age [10]. International cooperation is important in such public health campaigns and Switzerland takes part in the European Influenza Surveillance System [11].

Influenza vaccination is now better accepted by the general public, as well as within the medical community. Several studies in Europe and North America have shown appropriate immunisation coverage among target groups [12–16]. In Switzerland, a recent study showed that 78% of medical doctors consider the immunisation as a public health priority [17]. In an other study, including target group patients, 8% were vaccinated in hospital and 55% by their medical practitioner [18]. In 1993, Barazzoni found that influenza vaccination coverage among institutionalised elderly people in the canton of Ticino, varied between 48% and 61% [19]. In a recent study among people older than 60, vaccine coverage was found to be 51% in the French speaking part of Switzerland, whereas it was lower in the German and Italian speaking cantons (41% and 38%, respectively)

[20]. These figures are substantially below the correspondent coverage in neighbouring countries.

In autumn 2000, the Health Department of the Canton of Vaud implemented a population-based influenza prevention program among people older than 65. The aim of this program was to improve the image of the vaccination among the target population [21], in particular the awareness and knowledge about influenza and immunisation by involving health professionals. A secondary objective was to improve vaccination coverage in the elderly population. The project used the local health services network in the Canton of Vaud: the Health Department, the medical-social services, the medical outpatient clinics, health leagues, the cantonal associations of physicians and pharmacists, etc. Clubs and Associations for elderly people were also involved to improve vaccination cov-

erage. The main activities of the project, were information-meetings about influenza vaccination among associations for the elderly (eg, Pro-Senectute), and for the staff of socio-medical institutions and services. Information tools were developed, such as a video, information leaflets, brochures, articles in the lay press, a website and a press-conference. In addition, information was transmitted by the local TV-network.

The aim of this study was to evaluate the impact of this population-based prevention program: "*Un plus pour les SENIORS: la vaccination contre la grippe*". Secondary aims of the study were to assess which sub-groups responded best to the program, which component of the program had the most impact, and which factors were predictors of vaccination coverage.

Methods

A pre-intervention/post-intervention design was chosen to assess the impact of the population-based prevention of influenza program, among 96'657 people over the age of 65, living in the Canton of Vaud, Switzerland. The pre-intervention vaccination coverage survey was performed during the summer of 2000. Following that, the population-based prevention program took place in the autumn of 2000, and finally, the post-intervention survey was done during the spring of 2001.

Studied population

In June 2000, 4007 questionnaires were sent for the pre-intervention survey to people older than 65, living in the Canton of Vaud. This population was selected using a random sample, stratified by age categories and civil status of the elderly population. After two weeks, a reminder card was sent to all recipients, followed by a second and a third questionnaire after, respectively, one and two months, if the person had not responded to the previous mailings. The same procedure was used for the second survey in 2001. A different sample was randomly selected, and 4007 questionnaires were sent in March 2001.

Data entry was repeated for a random sample of 100 questionnaires, to assess its quality. Errors were found in 0.29% (95% CI: 0.11%–0.47%) of double-entered questionnaires.

Questionnaire

The questionnaires were developed in collaboration by the Health Department of the Canton of Vaud, and the

Institute for Social and Preventive Medicine, University of Lausanne. Questions about immunisation, influence and motivation for vaccination, and reasons for its refusal were included, as well as questions related to predictive factors to the vaccination, such as demographic or socio-economic characteristics and contact with medical doctors or social services during the fall. The questionnaire used for the post-intervention survey in 2001 was shorter, and included the same items and also questions about the impact of the prevention program. In both surveys, if a person refused to participate in the study, the main reason for this refusal was requested.

Statistical analysis

In both surveys, we first carried out a descriptive, univariate analysis of all the variables. In addition in the first survey, bivariate and multivariate analyses were conducted, to assess the role of the different predictors in relation to the vaccination. For the bivariate analysis, chi-square tests were implemented. For the multivariate analysis, a logistic regression analysis was performed. A backward elimination procedure was used to find the best-fitting model [22]. Interaction variables were dropped from the model, because none were statistically significant. However the variable "sex", also not significant, was considered as a possible confounding factor and kept in the model. All the analyses were done using the SAS software (SAS Institute Inc., Cary, NC, USA).

Results

Out of 4007 questionnaires which were sent out in the pre-intervention survey, 137 of the responders were ineligible, 29 returned incomplete, 908 individuals refused to participate and 2933 were completed and returned (participation rate: 75.8% (2933/3870 eligible)). In the post-intervention survey, 4007 questionnaires were sent out, 182 persons were ineligible, 228 returned incomplete,

499 of the study group refused to participate and 3098 were completed and returned (participation rate: 81.0% (3098/3825 eligible)). We further excluded two persons in the first survey and six in the second, because they were less than 65 years old. In the pre-intervention survey 31.3% of the persons who refused to participate stated their main reasons for not participating. These were: "lacking

interest" for 51.8%, "questions too personal" for 7.4%, "unable to answer" for 6.7%, "momentarily not available" for 4.9%, "does not understand French" for 3.9%, "no time" for 2.1% and "other reasons" for 42.3%.

In the 2000 pre-intervention survey the mean age was 74.7 years and in the 2001 post-intervention survey 74.3 years. Table 1 describes patients' characteristics in both surveys (2000 and 2001).

Vaccination coverage

Results from the pre-intervention survey implemented in 2000 showed that the vaccination coverage among people older than 65 living in the Canton of Vaud was 58.0% in 1999 (95% CI: 56.2%–59.8%). In the post-intervention survey done in 2001, the vaccine coverage in 2000, among the same population, was 58.4% (95% CI: 56.6%–60.2%).

In 1999 vaccination rates were 58.6% for men, and 57.8% for women ($p = 0.672$). In 2000 the rates were 58.9% for men, and 58.2% for women ($p = 0.717$).

Impact of the programme

Table 2, shows that vaccination coverage increased with age, until age 90, in both surveys. Overall, vaccination coverage was similar in 1999 and in 2000 ($p = 0.757$). However, a significant in-

crease (6.5%) in vaccination coverage was observed in the sub-group of people aged 65 to 69 ($p = 0.008$).

Figure 1 shows that in 1999, vaccination rates were 22.6% among people who did not consult a physician, 59.2% among those who had consulted a physician once and 73.2% among those who had consulted twice or more during in the autumn. The difference between the three groups was statistically significant ($p = 0.001$). For the vaccination rate in 2000, these figures were respectively 30.8% for those who had never consulted a physician, 58.0% for those who had consulted once, and 75.1% for those who had consulted twice or more. The difference between the three categories was also statistically significant ($p = 0.001$). The immunisation coverage was 74.7% among those who had had a home visit from a social worker (nurse or other family-help), and 55.4% among those who had not ($p = 0.001$). In 2000, these figures were respectively 76.0% and 56.0% ($p = 0.001$).

52.7% of all the respondents in the post-intervention survey (older than 65 living in the Canton of Vaud) knew about the program. The program 'SENIORS +' used different tools to increase vaccination coverage. The brochure "*La grippe se sert de vous*" was the tool which had the most impact (28.7%) (table 3).

During the post-intervention survey, 69.5% of

Table 1
Patients characteristics in the two samples, N = 2931 in 2000 and N = 3092 in 2001.

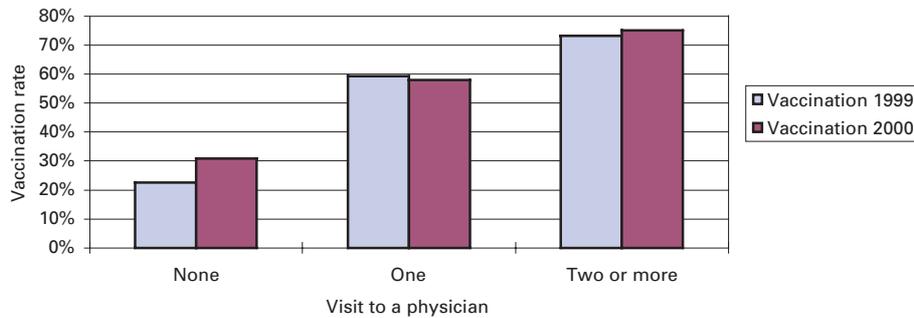
	Patients characteristics	pre-intervention survey 2000 N (%)	post-intervention survey 2001 N (%)
Age group	65–69 years	805 (28.0)	877 (29.0)
	70–74 years	723 (25.2)	792 (26.2)
	75–79 years	638 (22.2)	692 (22.9)
	80–84 years	410 (14.3)	396 (13.1)
	85–89 years	242 (8.4)	190 (6.3)
	≥90 years	54 (1.9)	74 (2.4)
Sex	men	1272 (44.2)	1330 (43.8)
	women	1606 (55.8)	1704 (56.2)
Visit to a physician during the fall	none	575 (20.8)	737 (25.6)
	one	955 (34.6)	883 (30.6)
	two or more	1228 (44.6)	1262 (43.8)
Medico-social service	visit	224 (8.3)	245 (8.5)
	no visit	2466 (91.7)	2651 (91.5)

Table 2
Survey 2000 and 2001: vaccination rate in 1999 (N = 2872) and 2000 (N = 2924) per age group.

Age group	survey 2000 vaccination 1999 N (%)	survey 2001 vaccination 2000 N (%)	difference between surveys in%	P value
65–69 years	316 (40.5)	401 (47.0)	6.5	0.008
70–74 years	409 (58.6)	439 (57.5)	–1.1	0.682
75–79 years	410 (66.5)	424 (62.8)	–3.7	0.172
80–84 years	274 (69.0)	271 (71.3)	2.3	0.484
85–89 years	167 (72.6)	126 (69.2)	–3.4	0.452
≥90 years	32 (64.0)	47 (66.2)	2.2	0.803
Total	1608 (58.0)	1708 (58.4)	0.4	0.757

Figure 1

Survey 2000 and 2001: vaccination rate 1999 (N = 2664) and 2000 (N = 2789) and the frequency of visit to a physician.



the participants declared themselves willing to have the vaccination in autumn 2001. Intentions for vaccination in 2001 were respectively 63.4% for the group 65 to 69 years, 68.3% for the group 70 to 74 years, 71.1% for the group 75 to 79 years, 77.3% for the group 80 to 84 years, 76.5% for the group 85 to 89 years, and 73.0% for people older than 90 years.

Motivations for or against vaccination

The different reasons that motivated people to be vaccinated against influenza are listed in table 4. Receiving advice from a medical doctor was considered very important, and was associated with vaccination coverage of 67.8% and 65.8% in the pre and post-intervention survey respectively. Reasons for not being vaccinated are described in

Table 3

Survey 2001: means by which people had acquired knowledge about the SENIORS+ program, N = 1535.

Means	N (%) *	vaccination rate in 2000 in %
Brochure «la grippe se sert de vous»	441 (28.7)	63.1
Article published in a magazine («Génération»)	335 (21.8)	59.3
Local TV (Autumn 2000) **	309 (20.1)	59.8
TV-advertisement (“Miss Suisse”)	225 (14.7)	52.0
Advertisement of the programme SENIORS+ in the local press	154 (10.0)	47.7
Brochure with a letter from cantons “surgeon general”	153 (10.0)	48.7
Itinerant exhibition	51 (3.3)	63.3
Participation in a meeting of a group of elderly people	38 (2.5)	62.9
Video of the SENIORS+ program	33 (2.1)	76.7
Breakfast-contact in a trade fare (Pro-Senectute)	13 (0.8)	66.7
Website about the activities of the SENIORS+ program	6 (0.4)	0
Other ways	247 (16.1)	53.8

* Several answers were possible, the total might exceed 100%
 ** Local television in the region of Lausanne.

Table 4

Survey 2000 and 2001: motivation to be vaccinated, N = 1636 in 2000 and N = 1746 in 2001.

Reasons for being vaccinated	survey 2000: N (%) *	survey 2001: N (%) *
Advice from a physician	1109 (67.8)	1149 (65.8)
Refusal of disease	372 (22.7)	374 (21.4)
Fear of Influenza	336 (20.5)	337 (19.3)
Scared to contaminate someone	157 (9.6)	183 (10.5)
Suffering chronic disease	147 (9.0)	173 (9.9)
Has numerous contacts	84 (5.1)	98 (5.6)
Other reasons	124 (7.6)	124 (7.1)

* Several answers were possible, the total might exceed 100%.

Table 5

Survey 2000 and 2001: reasons not to be vaccinated, N = 1183 in 2000, and N = 1242 in 2001.

Reasons for not being vaccinated	survey 2000: N (%) *	survey 2001: N (%) *
Not being afraid of influenza	368 (31.1)	387 (31.2)
Afraid about the side effects of the vaccine	318 (26.9)	296 (23.8)
Has not thought about vaccination	182 (15.4)	150 (12.1)
Do not believe the vaccine to be efficacious	155 (13.1)	160 (12.9)
Not concerned	111 (9.4)	114 (9.2)
No more vaccine available	not asked	40 (3.2) **
Other reasons	259 (21.9)	246 (19.8)

* Several answers were possible, the total might exceed 100%.
 ** Question asked after global vaccine shortage in winter 2000-2001.

Table 6

Survey 2000: Bivariate and multivariate analyses, predictors of influenza vaccination.

Predictors	bivariate analysis			multivariate analysis, N = 2579		
	crude RR	95% CI	P	adjusted OR	95% CI	P
Age (N = 2772)						
65–69 years	1.00		ref *	1.00		ref *
70–74 years	1.45	1.30–1.61	0.0001	1.96	1.57–2.46	0.0001
75–79 years	1.64	1.48–1.82	0.0001	2.62	2.06–3.33	0.0001
80–84 years	1.70	1.53–1.90	0.0001	2.85	2.15–3.78	0.0001
85–89 years	1.79	1.60–2.01	0.0001	3.29	2.29–4.73	0.0001
>90 years	1.58	1.26–1.98	0.001	1.77	0.94–3.33	0.078
Sex (N = 2776)						
	1.01	0.95–1.08	0.672	1.14	0.96–1.35	0.147
Visit to a physician (N = 2664)						
None	1.00		ref *	1.00		ref *
One	2.62	2.23–3.09	0.0001	2.52	2.05–3.10	0.0001
Two or more	3.24	2.77–3.80	0.0001	4.51	3.65–5.57	0.0001
Used medico-social services (N = 2601)						
	1.35	1.24–1.47	0.0001	1.90	1.33–2.72	0.0004

* ref = reference group

table 5. In both surveys, the main reason was “not being afraid of influenza”.

Predictors for influenza vaccinations

Bivariate and multivariate analyses were conducted using results of the 2000 pre-intervention survey to determine which factors are predictors of influenza immunisation. These results are pre-

sented in table 6. The adjusted odds ratio for the different age categories, compared with people aged 65 to 69 years, were all statistically significant. The adjusted odds ratio was 2.52 (95% CI: 2.05–3.10) for people who had consulted a physician once, and 4.51 (95% CI: 3.65–5.57) for people with two or more visits, compared with persons who had not consulted a physician.

Discussion

Influenza remains a major public health threat, especially for individuals over 65 years [1–3]. In particular, excess of mortality was estimated to be between 43% to 65% among people older than 65 years in the US [21].

In autumn 2000 the Health Department of the Canton of Vaud implemented a population-based prevention program to improve influenza immunisation coverage among elderly people. Results of this evaluation study showed that overall, no increase in vaccination coverage was observed between the two surveys (before and after the program). Only a significant 6.5% absolute increase was observed in the age-group from 65 to 69 years of age, contrasting with not significant decrease observed in other more vulnerable age groups. We also showed an 8.2% absolute increase in people who had not consulted a physician during the autumn. These were, however, probably “healthy” elderly individuals compared with those who consulted several times. Among those persons who were in the high-risk group, we observed almost no changes. The prevention program seems to have had an impact only on the elderly at low risk.

The population-based prevention program ‘SENIORS+’ seems to have had very good exposure in the population, since 53% of the people in the sample knew about it. A brochure (“*La grippe*

se sert de vous”) was the main element. Physicians have an important role to play in motivating people for influenza immunisation, as the main source of motivation was advice received from a physician.

Several obstacles for achieving higher vaccination coverage remain, including the fact that a large minority of at-risk individuals fear secondary effects of the vaccine, are either not afraid of influenza, or not convinced of the vaccine’s effectiveness. The most important predicting factors for influenza immunisation among elderly people were age and medical visits during the autumn. Physicians indeed play an important role for improving immunisation rates. They ought to continue in this direction and promote influenza vaccination each autumn in the outpatient setting, in nursing homes and even in hospitals.

The campaign was adequate and well designed. It was important in particular to involve health professionals. A similar campaign was then implemented at the national level by the Swiss Federal Office of Public Health, which included lessons learned from the program in the canton of Vaud [23].

The vaccination coverage observed in this study among people older than 65 are comparable to those described in other European- or North American countries. For example, rates of 60%

were reported in a study conducted in The Netherlands [24], and 52% in a Canadian survey [25]. In another study performed in the USA, influenza vaccination coverage was 58% among a similar population [26]. Compared to vaccination rates recently described in a study conducted in Switzerland in adults aged 60 and over, our results were higher than those observed in the German and Italian speaking parts of the country, but similar to the rates previously observed in the French speaking part of country (51%) [20].

Although our study gave reliable results because we used a large random sample and obtained a very high participation rate, several weaknesses and limitations should be mentioned. First, a pre-post-intervention design was chosen instead of a randomised or a quasi-experimental trial. A control group could not be assembled for practical and ethical reasons and it was impossible to conduct an experiment using a control population in another canton without performing an intervention. With this design (two cross-sectional surveys), it was in particular not possible to assess the causal association with this prevention program and the vaccination coverage. Secondly, we encountered some

difficulties with the address file used, which included several mistakes (eg, people younger than 65, or people who had died). This source of data was also not completely representative of the entire population of the Canton of Vaud, because it didn't include elderly living in nursing homes, or foreigners with Permit A and B. Third, it is possible that the increase of the vaccination coverage in the 65-69 years age group between the two surveys is due to a recall bias that might have occurred among older age groups.

In conclusion, improvements of vaccination rates in elderly people may be achieved through implementation of a population-based prevention program, such as SENIORS+. Such programs may have an impact on low risk young elderly (65-69 years), who did not have any contact with a physician. Also we didn't observe a short term effect of the campaign, a long term effect might be seen if we repeat the survey in 2 or 3 years. Further increase in vaccination coverage may be obtained by diversification and repetition of such promotional campaigns, for instance the new campaign [23] from the Swiss Federal Office of Public Health.

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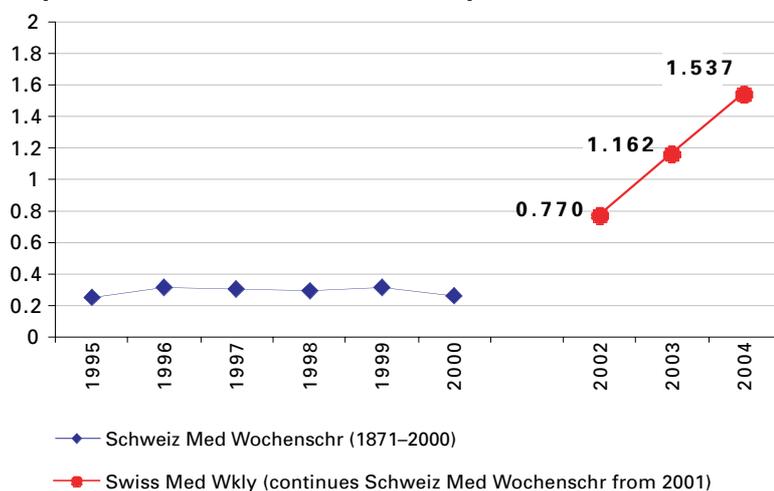
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