

Influenza Vaccination Among Diabetic Adults

Related factors and trend from 1993 to 2001 in Spain

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People with diabetes constitute a target group for influenza vaccination since they are currently thought to run a high risk of suffering influenza-related complications (1–3).

Influenza vaccination has shown itself to be capable of producing an adequate immunologic response in subjects with diabetes, proving effective in reducing mortality and morbidity in patients with underlying chronic diseases, including diabetes, and reducing hospital admissions among diabetic patients during influenza epidemics (3–8).

For over a decade, Spanish and U.S. health authorities been recommending annual influenza vaccination for subjects who suffer diabetes (2,9,10).

To our knowledge, no nationwide campaigns exclusively targeting people with diabetes were conducted in Spain by either public or private institutions across the study period.

Based on data drawn from the 1993 and 2001 Spanish National Health Surveys (NHS), this study was aimed at 1) ascertaining influenza vaccination coverages among Spanish diabetic adults for years 1993 and 2001, 2) analyzing which factors were associated with the likelihood of persons with diabetes being vaccinated, and 3) analyzing the time trend in

influenza vaccination coverages for the period 1993–2001.

RESEARCH DESIGN AND METHODS

A descriptive cross-sectional study was conducted on adult subjects (age ≥ 16 years) in Spain using individualized secondary data furnished by the 1993 and 2001 NHS. These surveys cover a representative sample of Spain's noninstitutionalized population. The 1993 and 2001 NHS used multistage, stratified cluster sampling, with proportional random selection of primary and secondary sampling units (towns and sections, respectively) and selection of the final units (individuals) by means of random routes and sex- and age-based quotas (11,12).

Subjects were classified as having diabetes if they answered affirmatively to either or both of the following questions: "Has your doctor told you that you are currently suffering from diabetes?" and/or "Have you taken any medication to treat diabetes in the last two weeks?"

To assess influenza vaccination status we considered the response to the question "Did you have a flu shot in the latest campaign?" The independent variables analyzed are shown in Table 1.

Statistical analysis

We first calculated the prevalence of diabetic subjects and the proportion of these who reported having been vaccinated against influenza (coverages) for each of the two NHSs. Second, influenza vaccination coverages in each of the two surveys were calculated according to the study variables and then compared. Third, multivariate logistic regression models were generated so that we could determine which of the variables covered were independently associated with influenza vaccination in each of the two surveys. Fourth, to assess the overall trend across the period 1993–2001, the crude and adjusted odds ratios (ORs) of having been vaccinated in 2001 vs. 1993 were duly computed. Estimates were made by incorporating the complex sampling design and weighting factors, using the "svy" (survey commands) functions of the STATA 8.0 program.

RESULTS — The total number of subjects finally analyzed in the 1993 and 2001 NHSs amounted to 20,880 and 21,034, respectively.

Of these, 911 in 1993 (4.4%, 95% CI 4.1–4.6) and 1,232 in 2001 (5.9%, 5.5–6.2) were classified as people with diabetes. The proportion of diabetic subjects who reported having been vaccinated was 43.2% (95% CI 40–46.4) in 1993 and 48.8% (46–51.6) in 2001. Furthermore, influenza coverage was significantly higher among diabetic versus nondiabetic subjects in both 1993 (43.2 vs. 16.7%) and 2001 (48.8 vs. 17.5%). In both years, after adjusting for potential confounders (age, sex, and comorbidity), the likelihood of being vaccinated was significantly higher among diabetic than among nondiabetic subjects (OR = 1.68 and 1.65, respectively).

Table 1 shows the crude vaccination coverages broken down by sociodemographic and health-related variables. The multivariate analysis showed that in 1993, the three variables that were independently and significantly associated

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Abbreviations: NHS, National Health Survey.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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Table 1—Distribution and influenza vaccination coverages among Spanish diabetic adults and coverages among nondiabetic adults according to the 1993 and 2001 National Health Surveys by sociodemographic and health-related variables

Variable	1993 NHS			2001 NHS		
	People with diabetes	Coverage (people with diabetes, %)		People with diabetes	Coverage (people with diabetes, %)	
		Yes	No		Yes	No
Age (years)*†‡						
16–49	111 (12.4)	17.1	8.1	154 (12.5)	16.9	6.7
50–64	351 (38.6)	34.5	21.8	363 (29.4)	38.6	18.4
65	443 (49)	56.4	47.9	715 (58.1)	60.8	55.1
Sex*						
Female	568 (62.4)	43	16.6	668 (54.2)	49.9	17.8
Male	342 (37.6)	43.9	16.9	564 (45.8)	47.5	17.2
Age at conclusion of formal education (years)‡						
<16	825 (91.2)	43.9	20.3	1,095 (88.9)	50.5	22.9
16	79 (8.8)	36.7	10.3	136 (11.1)	34.6	9.3
Perception of health status†‡						
Excellent/ good	245 (27)	35.5	12.4	379 (30.8)	43.3	12.5
Fair/poor/very poor	662 (73)	45.9	27.2	850 (69.2)	51.1	30.4
Comorbidity (presence of heart and/or lung disease)†‡						
No	718 (78.9)	39.7	14.6	935 (75.9)	45.2	14.8
Yes	192 (21.1)	56.3	43.5	297 (24.1)	59.9	47.2
Obesity*						
BMI <30 kg/m ²	478 (80)	42.4	15.2	637 (72.2)	46.6	15.4
BMI ≥30 kg/m ²	119 (20)	44	23	245 (27.8)	47.1	23.1
Tobacco use†‡						
Nonsmoker	746 (82.7)	45.2	20.4	1,006 (82)	52.4	22.2
Smoker	156 (17.3)	34.6	10.4	221 (18)	32.6	8.9
Alcohol consumption*†‡						
Nondrinker	648 (72.2)	46	20.2	817 (66.3)	50.9	21.8
Drinker	249 (27.8)	36.5	13.2	414 (33.7)	44.4	13.7

Data are n (%) unless otherwise indicated. *Statistically significant association ($P < 0.05$) on comparing the distribution of variables between the two NHSs. †Statistically significant association ($P < 0.05$) on analyzing vaccine coverages in the 1993 NHS. ‡Statistically significant association ($P < 0.05$) on analyzing vaccine coverages in the 2001 NHS.

with a higher likelihood of receiving the vaccine were age, presence of comorbidity, and male sex. Hence, vis-à-vis the reference category (16–49 years), people with diabetes aged ≥65 years were 5.77 times more likely to have been vaccinated, with the presence of a related disease increasing this likelihood a further 1.51-fold. With the single exception of sex, predictive variables were the same for 2001 as for 1993, yielding adjusted ORs of 6.59 for age ≥65 years and 1.53 for the presence of associated diseases.

The other high-risk groups covered by the NHS and constituting an indica-

tion of influenza vaccination in Spain, irrespective of age, are subjects with chronic respiratory or cardiac diseases. After adjusting for potential confounders (age and sex), the likelihood of being vaccinated in 1993 and 2001 did not differ significantly between persons with diabetes and adults with other chronic diseases.

When we analyzed the trend in influenza coverage from 1993 to 2001, the crude OR of having been vaccinated in 2001 was statistically significant with respect to 1993 (1.25 [95% CI 1.05–1.48]). Yet, on controlling for possible confounding variables, the OR lost statistical signifi-

cance (adjusted OR 1.17, 0.97–1.41), which means that the likelihood of a diabetic subject having been vaccinated in 2001 did not differ significantly from that in 1993.

CONCLUSIONS— The most relevant results of this study are that influenza vaccination coverages among Spanish diabetic adults are below desirable levels and that, after controlling for the influence of confounding variables, there has been no significant improvement in coverage between 1993 and 2001.

Arguably, the main limitation of this study is that the use of unvalidated self-report data on vaccination might entail possible bias. In this respect, however, several studies observe that self-response on influenza vaccination is highly sensitive and evinces a high degree of agreement (13–15).

The coverages described for Spain are appreciably lower than those reported for the U.S. and other European countries (16–25).

The usefulness of organizational and educational improvements achieved by health organizations and services for the purpose of enhancing vaccination coverages in high-risk groups in general and individuals with diabetes in particular, has been stressed by different authors (22,26–32). The situation among Spanish diabetic adults calls for the implementation of strategies aimed at improving the use of influenza vaccine.

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