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SCIENTIFIC LETTER

Effectiveness of the flu vaccine to prevent severe flu

Efectividad de la vacuna antigripal para prevenir la gripe grave

Dear Editor:

The World Health Organization, the European Council and the recommendations of the Advisory Committee on Vaccines of the Asociación Española de Pediatría (Spanish Association of Pediatrics) contemplate, among other possibilities, annual vaccination against influenza as the most effective strategy to prevent the disease and its repercussions, especially in children with chronic conditions who require ongoing medical care.[1,2]

The effectiveness of the influenza vaccine can vary widely between seasons depending on the match between vaccine and circulating strains, so it is important to study it on a yearly basis. The aim of our study was to assess the effectiveness of the 2017/2018 season influenza vaccine in the prevention of severe cases of influenza in the paediatric population managed in a general acute care hospital with 385 beds. We conducted an observational case-control study. The study included all patients aged 0–14 years admitted to hospital for a minimum of 24 h with a laboratory-confirmed diagnosis of influenza. We considered cases those patients who met the criteria for an inpatient case of confirmed influenza defined by the Influenza Surveillance System of Spain[3]:

- *Clinical criteria*: clinical features compatible with influenza (pneumonia, multiple organ failure, septic shock or admission to the intensive care unit) and need of hospital admission.
- *Laboratory criteria*: Isolation of influenza virus from a respiratory sample, detection of viral RNA.

We considered controls those patients admitted to hospital for at least 24 h with influenza confirmed by laboratory who did not meet the definition of severe confirmed influenza for hospitalised patients.

Infection by influenza virus was established by means of real-time reverse-transcriptase polymerase chain reaction testing of nasopharyngeal swab samples obtained from patients with manifestations compatible with influenza, which was performed in the microbiology laboratory.

The study was approved by the Clinical Research Ethics Committee of the Hospital General Universitario de Elda under code GRD 1.0. We did the statistical analysis with the software IBM SPSS® Statistics, version 25.0.

The sample included 92 patients, 48 boys and 44 girls, admitted due to suspected influenza, of who only 53% of boys and 48% of girls had been vaccinated against influenza. The type was established in every case, and was influenza A in 100% of the patients. The attack rate was 0.21 per 100 inhabitants and the vaccine effectiveness 26%. The mean length of stay was 4.16 days.

Table 1 presents the characteristics of the patients by vaccination status. As regards the underlying conditions, we found a significant association of vaccination with asthma ($P = .048$), immunosuppressed status ($P = .014$) and being a household contact of an at-risk individual ($P = .028$).

The factors associated with the development of influenza can be seen in Table 2. When we analysed the factors associated with developing disease, we found that being vaccinated against influenza was an independent protective factor (OR = 0.814; 95% confidence interval, 0.756—0.956). This protective effect of vaccination has also been found in other studies, in which vaccination in the current season, independently of vaccination history in previous seasons, was associated with reduced severity of disease and greater protection against infection.[4]

Vaccination was most frequent in children aged less than 5 years (74%). Vaccination of healthy children is particularly effective, as they mount excellent immune responses to the vaccine, so this subset of the population is a preferential target for vaccination when the goal is to prevent disease transmission.[4]

The vaccination coverage achieved in the 2017/2018 season in the study sample was 48%. When we compared this to the rates reported in studies conducted in other autonomous communities in Spain,[5] we found heterogeneous results depending on the implemented vaccination strategies.

Overall, the effectiveness of the vaccine in preventing confirmed influenza cases in children was not very high. Factors that could have been at play in this result include the timing, duration and intensity of the influenza season and the predominant circulating strains. This aspect was also addressed in other studies conducted in the South-

Table 1 Characteristics of vaccination.

	Total n (%)	Vaccinated n (%)	Unvaccinated n (%)	P[b]
Sex				
Male	48 (52.2%)	20 (53.1%)	28 (53.8%)	.525
Female	44 (47.8%)	19 (48.7%)	25 (47.2%)	
Age				
0—5 years	58 (63%)	29 (74.4%)	29 (54.7%)	.043
6—14 years	34 (37%)	10 (25.6%)	24 (45.3%)	
Comorbidity[a]				
Asthma	25	21 (31.8%)	4 (15.4%)	.048
Diabetes mellitus	21	4 (15.4%)	17 (25.8%)	.217
Obesity	4	0 (0%)	4 (6.1%)	–
Chronic renal failure	5	0 (0%)	5 (7.6%)	–
Cancer	1	0 (0%)	1 (1.5%)	–
Cardiovascular disease	7	3 (11.5%)	4 (6.1%)	.310
Immunosuppressed	14	8 (30.8%)	6 (9.1%)	.014
chronic salicylate treatment	2	1 (3.8%)	1 (1.5%)	–
Household contacts of at-risk individuals	10	6 (23.1%)	4 (6.1%)	.028

[a] At least one of the conditions specified in the table.
[b] χ^2 test: significant if $P \leq 0.05$.

Table 2 Factors associated with development of severe influenza grave.

	Severe flu[a] N = 50 n (%)	Nonsevere flu[b] N = 42 n (%)	cOR (95% CI)	P
Age				
0—5 years	29 (58%)	29 (69%)	1.615 (0.628—3.826)	
6—14 years	21 (42%)	13 (31%)	1	.276
Sex				
Male	26 (52%)	22 (52.4%)	1.015 (0.447—2.308)	.471
Female	24 (48%)	20 (47.6%)	1	
Vaccinated				
Yes	11 (22%)	28 (66.7%)	0.814 (0.756—0.956)	.001
No	39 (78%)	14 (33.3%)	1	
Comorbidity[c]				
Asthma	13 (26%)	12 (28.6%)	0.878 (0.573—1.518)	.482
Diabetes mellitus	7 (14%)	14 (33.3%)	0.592 (0.390—0.898)	.025
Obesity	2 (4%)	2 (4.8%)	0.909 (0.332—2.487)	.623
Chronic renal failure	2 (4%)	3 (7.1%)	0.747 (0.352—1.586)	.417
Cancer	1 (2%)	0 (0%)	–	–
Cardiovascular disease	4 (8%)	3 (7.1%)	1.071 (0.441—2.597)	.598
Immunosuppressed	9 (18%)	5 (11.9%)	1.328 (0.633—2.785)	.304
chronic salicylate treatment	1 (2%)	1 (2.4%)	–	–
Household contacts of at-risk individuals	9 (18%)	1 (2.4%)	0.556 (0.412—0.749)	.016

CI, confidence interval; cOR, crude odds ratio.
[a] N: number of patients with severe influenza (cases).
[b] N: number of patients with nonsevere influenza (controls).
[c] At least one of the following: asthma, diabetes mellitus, obesity, chronic renal failure, cancer, cardiovascular disease, immunosuppression, chronic treatment with salicylates and household contacts of at-risk individuals.

ern hemisphere (Australia, Chile, New Zealand and South Africa).[6]

Possible limitations of the study include potential confounders that could have contributed to vaccination status as well as the development of severe influenza.

In conclusion, vaccination against influenza appeared to be effective in increasing protection against infection in the paediatric population in addition to reducing the severity of disease in hospitalised patients. These findings should be taken into account in terms of pursuing higher vaccination coverage in risk groups, with the ultimate goal of decreas-

ing the incidence of influenza in addition to the severity of disease.

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