Investigation on seasonal influenza vaccination among children with high-risk medical conditions who live in the area of Local Health Agency 4 "Chiavarese"

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Summary

Introduction. *The Italian Ministry of Health recommends influenza vaccination in patients with chronic diseases associated with an increased risk of influenza complications. We estimated the number of patients aged from 6 months to 14 years with chronic diseases living in the area of Local Health Agency 4 "Chiavarese".*
Materials and methods. *In order to estimate the number of children with chronic diseases, we evaluated data from three sources: the Health Charge Exemption Records Office; the "Nocchiero Project", implemented by the Regional Health Agency in 2009, and independent pediatricians.*
Results. *The pediatric population in the district of Local Health Agency 4 "Chiavarese" consists of 16,118 subjects. The percentage of children with high-risk medical conditions is 4.14% of the pediatric population according to records of health-charge exemption, 6.36% according to the "Nocchiero Project" data and 3.38% according to the data provided by pediatricians.*

In the 2010-2011 influenza vaccination campaign, 415 children were vaccinated at Local Health Agency 4 "Chiavarese"; 335 of these had chronic diseases. Vaccination coverage was estimated as 50.07% on the basis of the list of patients exempt from health care charges, as 65.68% by the independent pediatricians and as 31.45% according to the "Nocchiero Project" data.
Discussion. *Our investigation underlines the difficulty of dividing subjects into different risk categories. The data provided by independent pediatricians yielded higher estimates of vaccination coverage in pediatric patients than the data from the other two sources.*
Conclusions. *Estimates of vaccination coverage vary according to the source of data. However, pediatricians seem to be the most reliable source, as they know their patients better. Collaboration between health authorities and independent pediatricians should therefore be improved in order to obtain the best results in terms of influenza prevention in high-risk groups.*

Introduction

Health authorities throughout the world [1] recommend influenza vaccination in patients with chronic severe diseases associated with an increased risk of influenza complications [2]. The Italian Ministry of Health publishes every year before the winter season guidelines reporting these recommendations and specifies the groups of subjects at risk. In addition the Ministry sets a minimum target of vaccination coverage of 75% of the subjects at risk and an optimal target of 95%. It also recommends creating a list of subjects who should be actively contacted, and to whom vaccination should be offered free of charge [3].
We estimated the number of subjects aged from 6 months to 14 years with chronic diseases in the area of Local Health Agency 4 "Chiavarese", in order to determine the most accurate denominator for evaluating immunization coverage in this age-group.

Materials and methods

In order to identify subjects with high-risk medical conditions, we analyzed three sources of data: the database of the Health Charge Exemption Records Office; the database of the "Nocchiero Project" [4], implemented by the Regional Health Agency in 2009; and family pediatricians.
The "Nocchiero Project" identifies groups of subjects with homogeneous clinical features and records chronic and/or degenerative diseases for which treatment by the Regional Health System has been requested.
A specific software (SAS© 9.1) was used to process all data from the following sources: hospital discharge forms, the Health Charge Exemption Records Office, the Health Records Office, specialist outpatient services, local pharmaceutical services and day services. For our investigation, we requested a list of children who met the recruitment criteria, as indicated in the circular.
Our third source of data consisted of the sixteen independent pediatricians operating in our district (total number of patients 9,565). Twelve of these provided lists of their patients with high-risk medical conditions. The number of influenza vaccinations administered was calculated by means of the "OASIS" software used in our Local Health Agency.

Results

The pediatric population living in the district of Health Local Agency 4 "Chiavarese" numbers 16,118 subjects: 11,333 aged 5-14 years and 4785 aged 0-4 years.

According to the three sources used to identify children with high-risk medical conditions, the percentage of individuals who receive health care free of charge is 4.14% of the pediatric population, while the patients identified by the "Nocchiero project" account for 6.36%. By contrast, the percentage of high-risk patients reported by independent pediatricians is 3.38%.

Specifically, 871 subjects aged 5-14 years are classified as being at high risk by the "Nocchiero Project", 616 according to the list of those who receive free health care, and 326 according to the evaluation of independent pediatricians (Tab. I). With regard to subjects aged 0-4 years, patients identified on the basis of exemption from health care charges proved to be far fewer (53) than those indicated by the two other sources: 194 ("Nocchiero Project") and 184 (Pediatricians).

Among the high-risk categories indicated by the Ministry of Health, the group of subjects affected by chronic respiratory diseases is the largest, according to all three sources of data on pediatric patients: 59.13% of the total according to the list of patients receiving free health care, 75.68% on the basis of the "Nocchiero Project" data and 75% according to the estimates made by independent pediatricians. The most common chronic respiratory disease in both age groups is bronchial asthma, as indicated by all three sources.

The percentages of subjects affected by cardiovascular diseases were: 10.55% according to independent pediatricians, 5.07% according to the list of patients receiving free health care and 4.49% according to the "Nocchiero Project" data.

Cases of diseases involving lack of or altered antibody production were reported almost exclusively by independent pediatricians (3.9%).

Among patients receiving free health care, 11.33% of 0-4-year-olds and 10.57% of 5-14-year-olds fell into the category of registered disabled persons. This category is not recorded by the other two sources.

In the 2010-2011 influenza vaccination campaign, 415 subjects aged 0-14 years were vaccinated in the district of Local Health Agency 4 "Chiavarese"; 335 of these had chronic diseases: 73 aged 0-4 years and 262 aged 5-14 years. Vaccination coverage in high-risk pediatric pa-

Tab. I. Study population broken down by age-class, risk category and source evaluated.

Risk Categories	Age-groups								
	0-4 years			5-14 years			0-14 years		
	Exempt	Nocchiero Project	Pediatricians	Exempt	Nocchiero Project	Pediatricians	Exempt	Nocchiero Project	Pediatricians
a) Chronic respiratory diseases (asthma, bronchopulmonary dysplasia, cystic fibrosis, BPCO)	6 (11.33%)	122 (62.88%)	130 (69.89%)	389 (63.25%)	684 (78.53%)	254 (77.91%)	395 (59.13%)	806 (75.68%)	384 (75.00%)
b) Cardiovascular diseases (including congenital and acquired heart diseases)	6 (11.33%)	20 (10.32%)	28 (15.05%)	24 (3.91%)	34 (3.91%)	26 (7.97%)	30 (4.49%)	54 (5.07%)	54 (10.55%)
c) Diabetes mellitus and other metabolic diseases	4 (7.54%)	14 (7.22%)	4 (2.15%)	22 (3.58%)	45 (5.16%)	8 (2.45)%	26 (3.89%)	59 (5.54%)	12 (2.34%)
d) Kidney diseases with renal failure	0	1 (0.52%)	0	0	3 (0.35%)	0	0	4 (0.37%)	0
e) Hematopoietic organ diseases and hemoglobinopathies	2 (3.77%)	0	2 (1.07%)	8 (1.3%)	0	8 (2.45%)	10 (1.49%)	0	10 (1.95%)
f) Cancers	2 (3.77%)	3 (1.54%)	0	12 (1.95%)	11 (1.27%)	6 (1.84%)	14 (2.09%)	14 (1.31%)	6 (1.17%)
g) Pathologies involving lack of or altered antibody production and immunosuppression	0	0	10 (5.37%)	1 (0.16%)	1 (0.11%)	10 (3.07%)	1 (0.15%)	1 (0.09%)	20 (3.90%)
h) Chronic inflammatory diseases and malabsorption syndrome	13 (24.52%)	23 (11.85%)	6 (3.22%)	49 (7.97%)	43 (4.93%)	12 (3.68%)	62 (9.28%)	66 (6.19%)	18 (3.51%)
i) Pathologies requiring major surgery	3 (5.66%)	0	0	0	0	0	3 (0.45%)	0	0
l) Pathologies with high risk of respiratory secretion aspiration and other neurologic diseases (i.e. neuromuscular diseases)	11 (20.75%)	11 (5.67%)	4 (2.15%)	45 (7.31%)	50 (5.74%)	2 (0.62%)	56 (8.38%)	61 (5.73%)	6 (1.17%)
m) Registered disabled	6 (11.33%)	n.a.	n.a.	66 (10.57%)	n.a.	n.a.	72 (10.78%)	n.a.	n.a.
Total	53 (100%)	194 (100%)	184 (100%)	616 (100%)	871 (100%)	326 (100%)	669 (100%)	1065 (100%)	510 (100%)

tients was estimated as 50.07% among patients exempt from health care charges, 65.68% according to the independent pediatricians and 31.45% on the basis of the "Nocchiero Project" data (Fig. 1). In the 5-14 age-group, coverage rates were 42.53% (patients exempt from health care charges), 30.08% ("Nocchiero Project") and 80.36% (independent pediatricians). Among children aged 0-4 years, coverage was 37.63% ("Nocchiero Project") and 39.67% (independent pediatricians). As the number of children exempt from charges was lower than the number of vaccinated subjects of the same age, the calculation of coverage in this group yielded a value higher than 100%.

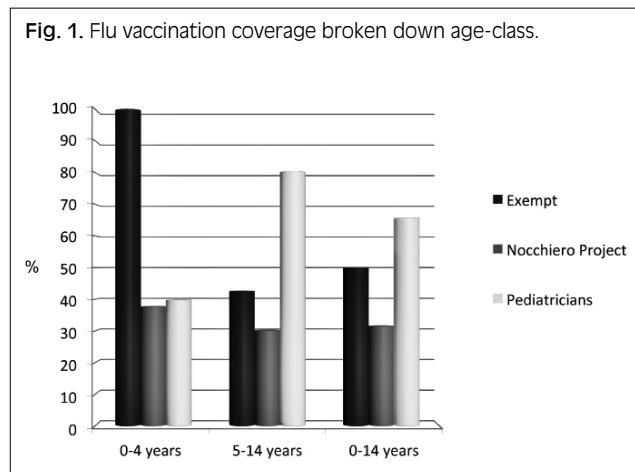**Fig. 1.** Flu vaccination coverage broken down age-class.

Discussion

Analysis of the data revealed that the main difficulty in evaluating vaccination coverage is to determine the best way of separating subjects into the various risk categories. Indeed, the data on patients receiving free health care and those from the "Nocchiero Project" are overestimated in the 5-14 years age group, when compared with the data provided by the independent pediatricians. On the other hand, with regard to children aged 0-4 years, the data from the "Nocchiero Project" and those provided by the independent pediatricians are very similar, while the data on patients exempt from health care charges are far lower.

Furthermore, the most common diseases indicated by the Italian Ministry of Health proved to be respiratory pathologies; however, the criteria adopted by the pediatricians in recommending influenza vaccination for subjects affected by these pathologies are not homogeneous, especially with regard to bronchial asthma.

General practitioners provided more specific indications regarding cardio-respiratory diseases and pathologies involving a lack of or altered antibody production and immunosuppression; this seems to indicate that the monitoring system of the pediatricians is more sensitive.

Moreover, the Ministry's circular does not seem to be sufficiently comprehensive in identifying the groups at risk of influenza complications. For instance, premature, immature and full-term newborns hospitalized in the neonatal intensive care unit are not considered, despite the fact that they are specifically mentioned in the circular on the 2009 pandemic caused by the H1N1 virus, which is still circulating.

Estimates of vaccination coverage according to the three different sources proved to be very different; overall, the data provided by independent pediatricians indicated a higher coverage rate than the data from the other two sources. On breaking down the population by age, the data on patients exempt from health care charges and those from the "Nocchiero Project" indicated higher vaccination coverage among children aged 0-4 years. However, as mentioned above, the calculation of vaccination coverage on the basis of the number of subjects exempt from charges yielded an anomalous result. According to the data provided by independent pediatricians, vaccination coverage among subjects aged 5-14 years was high; this is a very good result, in that general practitioners are considered to be a reliable source, owing to their close relationship with their patients.

Conclusions

This study highlights the differences among the systems used to identify subjects affected by pathologies at risk of influenza complications. Indeed, estimates of vaccination coverage based on the three sources were seen to vary markedly. However, general practitioners are considered to be the most reliable source of information, since their knowledge of their patients' medical history better enables them to identify subjects for whom vaccination is to be recommended. Collaboration between health authorities and independent pediatricians should therefore be improved in order to obtain the best results in terms of influenza prevention in high-risk groups.

References

[1] Seasonal Influenza Vaccination Recommendations of the World Health Organization. http://www.cdc.gov/flu/protect/children.htm#vaccination.

[2] Esposito S, Marchisio P, Droghetti R, et al. *Influenza vaccination coverage among children with high-risk medical conditions.* Vaccine 2006;24:5251-5.

[3] Circular Letter of the Italian Ministry of Health dated on 07/29/2010. http://www.normativasanitaria.it/normsan-pdf/0000/34861_1.pdf.

[4] Copello F, Bressi M, Bellia C. "Nocchiero Project". Regional Health Agency, 2009. http://www.arsliguria.it/index.php?option=com_content&task=view&id=2667&Itemid=155.

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ABSTRACT

Symptoms associated with the positivity to A/H1N1v during the pandemic 2009

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The Department of Public Health of the University of Parma participated in the epidemiological and virological surveillance of pandemic influenza virus A/H1N1v for the Western territory of the Emilia Romagna Region. The results of this activity will be presented, highlighting the data related to clinical and symptomatic aspects [1-3].

Between April 2009 and April 2010, 2,269 nasopharyngeal swabs were analyzed. Clinical information contained in the notification cards were analyzed retrospectively, in order to highlight any symptomatic aspect associated with the A/H1N1v infection. A univariate analysis using chi-square test and t Student test was performed. Statistical significance was set at 0.05. The possible association between A/H1N1v infection and the symptomatic history was studied by calculation of the corresponding value of Odds Ratio (OR) with the 95% confidence interval. Finally, the population involved in the survey was stratified on the basis of age at the moment of notification, with determination of the corresponding values of Hazard Ratio (HR) compared to the clinical variables investigated.

Five hundred and four samples were positive for virus A/H1N1v: the length of symptoms was estimated at 2.7 (*Standard Deviation* (SD) 2.6) days (in subjects negative: 3.6 (SD 4.2) days, $p < 0.0001$). The most frequent associated symptoms with the positivity for the Influenza virus were headache (OR 1.31; Confidence Interval (IC)95% 1.03-1.67), conjunctivitis (OR 2.05; IC95% 1.17-3.58), myalgia (OR 1.36; IC95% 1.08-1.71), fever (OR 1.43; IC95% 1.03-1.98), sore throat (OR 1.25; IC95% 1.01-1.55), cold (OR 1.37; IC95% 1.09-1.73), dry cough (OR 1.66; IC95% 1.33-2.08), while asthenia was not significantly associated with the diagnosis of positivity for influenza (OR 0.75; IC95% 0.59-0.95). In a multivariate model, a statistically significant association between positivity for virus A/H1N1v and myalgia (OR 1.51; IC95% 1.09-2.07) and dry cough (OR 1.83; IC95% 1.43-2.34) was confirmed. Stratifying data available on the basis of the age of the patients, we observed a significant association between positivity and dyspnea in the adults (for the age group 35-64 years, HR 1.47 IC95% 1.07-2.02; for the age ≥ 65 years, HR 5.63 IC95% 2.24-14.1).

The definition of ILI (Influenza-Like Illness), used for epidemiological surveillance provides the contemporary presence of a systemic symptom and one respiratory in addition to the presence of a temperature exceeding 38°C. In our cases the contemporary presence of dry cough, myalgia, regardless of the presence of fever was predictive of positivity.

References

[1] Monto SA, Gravenstein S, Elliott M, et al. *Clinical Signs and Symptoms Predicting Influenza Infection*. Arch Intern Med 2000;160:3243-7.

[2] Zambon M, Hays J, Webster A, et al. *Diagnosis of Influenza in the Community*. Arch Intern Med 2001;161:2116-22.

[3] Eskin B, Levy R. *Does This Patient Have Influenza?* Ann Emerg Med 2007;49:103-5.