Original article

Influenza vaccination among elderly in Pelotas-RS, Brazil, 2014: a population-based study*

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Abstract

Objective: to describe the prevalence of individuals vaccinated against influenza and associated factors with vaccination among elderly; identify reasons for noncompliance and adverse events. **Methods**: this was a cross-sectional study, conducted in the urban area of Pelotas-RS, Brazil, in 2014. **Results**: out of 1,451 elderly, 71% got vaccinated; the highest prevalences were observed in the elderly with better economic status (PR=1.2 – 95%CI 1.1;1.4), those who were not employed (PR=1.2 – 95%CI 1.1;1.3), those who were physically active (PR=1.1 – 95%CI 1.0;1.2), former smokers (PR=1.3 – 95%CI 1.1;1.5), those who were assisted by a health professional the previous year (PR=1.2 – 95%CI 1.1;1.4) and those who reported two or more health problems (PR=1.2 – 95%CI 1.1;1.4); the main reason for noncompliance (n=414) was 'did not want/do not like' (45%); the most frequently reported adverse events were malaise (49/83) and muscle ache (30/83). **Conclusion**: vaccination coverage was not universal; educational approaches are needed to clarify controversy on the efficacy, adverse events and benefits of vaccination.

Key words: Influenza Vaccines; Aged; Cross-Sectional Studies; Immunization; Mass Vaccination.

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Introduction

The growth of the elderly population is a worldwide phenomenon and has provoked a change in the epidemiological profile,[1] increasing the risk of diseases due to physiological alterations that result from ageing.[2] Thus, a new morbidity and mortality pattern among the elderly population can be noticed, and one of the main causes are the respiratory diseases. They represented the second major cause of hospitalizations in 2001,[3] and the third cause of death in 2007.[4] Influenza and its complications is among those diseases and, in 2002, they were responsible for approximately 10% of the total hospitalizations, causing deaths and expenses to health services, mainly due to the most severe form of the disease that strikes the population.[5,6]

> *Vaccination is considered the best strategy available for preventing influenza and its consequences, and has brought good results for the health system as a whole.*

Influenza is a viral acute infectious disease, and is highly contagious. It strikes the respiratory tract and its occurrence is mainly observed in the autumn and winter. Influenza is a fast spread disease and presents high morbidity and mortality, especially in groups with higher vulnerability.[2]

Influenza vaccination, the main Public Health action to prevent this disease, is a priority action of the Brazilian Ministry of Health and is part of its annual calendar since 1999.[7] Vaccination is considered the best strategy available for preventing influenza and its consequences, and has brought good results for the health system as a whole.[8] Besides that, the immunization generates a reduction of morbidity and mortality, of complications and hospitalizations due to virus infections,[9] as well as reduction of expenses with drugs for treatment of secondary infections.[10]

For this prevention measure to be effective among the elderly, the population must adhere to vaccination campaigns, which are still unsatisfactory.[11-14] In Brazil, although the vaccine has been provided for free, vaccine coverage has not reached the expected 80% for the years 2003, 2007 and 2009.[11-14] Some characteristics, such as advanced age, hypertension and diabetes, practice of physical activity, been assisted by a health professional the previous year, and guidance related to the importance of the vaccine are frequently described in the literature as positively associated to vaccination.[11-16] However, there is no consensus on the association with socioeconomic variables, sex and smoking, among others, with influenza vaccination.[11,12,14,16,17]

There are few studies on influenza vaccination in the South region of Brazil, where there is the highest proportion of elderly in the country.[18] Given that these factors may be crucial on adherence, and the increase of vaccine coverage has important impact on public health, the results of this research will probably be useful for management in the three levels of government (municipal, state, federal). The findings presented here may provide scientific subside to the implementation of projects capable of contributing to adherence of vaccination among the elderly population, taking their characteristics into consideration.

The objective of this study was to describe the prevalence of individuals vaccinated against influenza and associated factors with vaccination in elderly, identify reasons for noncompliance and adverse events.

Methods

This is a population based cross-sectional study, conducted from February to August 2014 in the urban area of Pelotas, Rio Grande do Sul State, Brazil, to investigate the health of the elderly population. This study is the result of a research consortium performed within the Programme of Master's in Epidemiology of the Federal University of Pelotas, and included projects of eighteen students who assessed various health outcomes for this age group.

Pelotas is a medium-sized municipality, located in the South region of Brazil and had 328,275 inhabitants in 2010, with predominance of urban population (93%).[18] At the time of this study, Pelotas had 38 primary health care units distributed in the urban area of the municipality.

All individuals aged 60 or over were included in the study, except for those who were institutionalized in geriatric care homes or in prisons. For those unable to answer to the survey, the information used was given by the caregiver (key-informant).

The size of sample for the prevalence study was calculated using as parameter a prevalence of vaccinated

individuals of 65%, confidence level of 95% and margin of error of four percentage points. With a 10% addition for losses and refusals, it would be necessary to interview 1,202 randomly selected individuals, counting with a design effect of 2.

For association analysis, we used a 5% alpha error, 80% statistical power, ratio of non-exposed to exposed individuals of 85/15 and prevalence ratios varying from 1.2 to 1.4, addition of 10% for losses and refusals and 15% for confounders' control, resulting in a total of 1,039 individuals.

The sampling process was conducted in two stages. Based on the 2010 Demographic Census,[18] all the 469 census tracts were placed in ascending order, according to the average income of the household, which ensured the participation of individuals from different socioeconomic status. The municipality had a total of 107,152 households, according to the Census,[18] so it was expected to find 0.4 elderly per home and 12 elderly per sector. Thus, 133 sectors were randomly selected and 31 households were systematically selected. In each selected household, all the elderly were invited to join the study. The selected individuals who were not found after three attempts at different times were considered as loss, and those who were eligible, but did not accept to take part in the survey were considered as refusals.

The study outcome, self-reported influenza vaccination, was assessed using the following question: "Did you take the influenza vaccine in 2013? (yes; no)". Besides that, the elderly also answered if they had a vaccination card; in case they answered yes, the interviewee checked if the 2013 influenza vaccine had been registered. The group of vaccinated elderly also answered to specific questions – type of service, if they had paid for the vaccine, if they were vaccinated during the campaign and if they had suffered any adverse event in the first days after vaccination – and the non-vaccinated group answered if they had ever taken influenza vaccine and the main reason for not having vaccinated the previous year.

The independent variables collected were:

a) Demographic

Sex (male; female); age, in years (60-69; 70-79; 80 or over); skin color (white; black; brown; yellow; indigenous); and marital status (with a companion; without a companion).

b) Socioeconomic

School level, in complete years (0-3; 4-7; 8-11; ≥12); economic classification according to the Brazilian Association of Research Companies[19] (A/B; C; D/E); and being employed (yes; no).

c) Behavioral

Physical activity during free-time, measured by the International Physical Activity Questionnaire (IPAQ), a tool validated in Brazil and used worldwide in researches on physical activities; 150 minutes/week is the minimum recommended by the World Health Organization[20] (active; minimally active); intake of any amount of alcoholic beverages the previous month (yes; no); and smoking (smoker; former smoker; never smoked) – smoker was the individual who smoked at least one cigarette the previous month.

d) Health problems

The surveyed individuals' history on hypertension, diabetes, heart problems, arthritis/rheumatism/arthrosis and asthma/emphysema/bronchitis were verified and scored (none; one; two or more) – it was assessed through the following question "Any doctor or health professional has said you have <disease>". Overweight was also calculated, based on the body mass index (BMI), using a cutoff of 27kg/m² (yes; no):[21] the height was estimated by measuring the knee height[22] and the weight was measured in the electronic scales TANITA®, model UM-080, with maximum capacity of 150 kilograms and 100 grams accuracy. For locomotion limitation, we considered the elderly who, by the view of the interviewer, were identified as wheelchair users or bedridden (yes; no).

e) Use of health services the previous year

It was measured as follows: "Since <month of the previous year>, were you assisted by any health professional?" (yes; no).

Aiming to provide the best quality of information and reduce biases, data collection was conducted in the households by previously trained interviewers, using the electronic questionnaire stored in portable devices, programmed with the software PENDRAGON®. The information quality control was performed by revisiting 10% of the surveyed individuals, randomly selected; for this group a summarized version of the instrument was applied, in order to assess data concordance through Kappa statistics. For the variable 'ever taken influenza vaccine', the value found was of 0.83, which represented an excellent concordance level.

Analyses were conducted with Stata® 12.1, using the svy command, due to the sampling process. The design effect found was of 1.13. Initially, we described

the sample according to the collected variables, estimating the prevalence of influenza vaccination in 2013 and the respective 95% confidence intervals (95%CI) according to these characteristics. Crude and adjusted prevalence ratios and the respective 95%CI were also calculated, using the Poisson regression with adjustment for robust variance.

The adjusted analysis was based on the hierarchy model: in first level there were the demographic and socioeconomic variables; in the second level, the behavioral, health problems and use of health services. These variables were inserted by levels, initially all of the first level and then all of the second level; those that presented a level of $p<0.2$ were kept in the model in order to control possible cofounders of the same level and superior levels.

This study was approved by the Ethics Research Committee of the Faculty of Medicine of the Federal University of Pelotas: Protocol No. 201324538513.1.0000.5317, dated November 28, 2013. The information was obtained after the participants signed the Free Informed Term of Consent.

Results

In the 3,799 households visited, there were 1,844 elderly individuals considered eligible for the sample, and 1,451 were interviewed; there were 179 losses (9.7%) and 214 refusals (11.6%) (Figure 1).

With regard to demographic variables, 63% were female, 52% were between 60 and 69 years old, 84% self-reported white and 53% lived with a companion. More than one third of the sample had up to three years of schooling, more than half of them were in the economic classification C (53%) and most of them were not employed (80%). With regard to behavior, 82% were classified as minimally active in free time, 13% were smokers and 21% had taken alcoholic beverage the previous month. Overweight was registered for 56% of the individuals and 56% reported having two or more health problems. Only 3% presented locomotion limitations and most of the individuals had used health services the previous year (88%) (Table 1).

The prevalence of ever taken influenza vaccine was of 81% (95%CI 79;83). In 2013, it was of 71% (95%CI 68;74) and in other years it was of 9.8% (95%CI 8;11).

The crude analysis of the independent variables – marital status, economic status, employment, physical activity in free time, smoking, assisted by a health professional the previous year and number of health problems were associated to vaccination in 2013 ($p<0.05$). Individuals with a companion, of economic classes A/B, who were not employed, physically active, former smokers, who were assisted by a health professional the

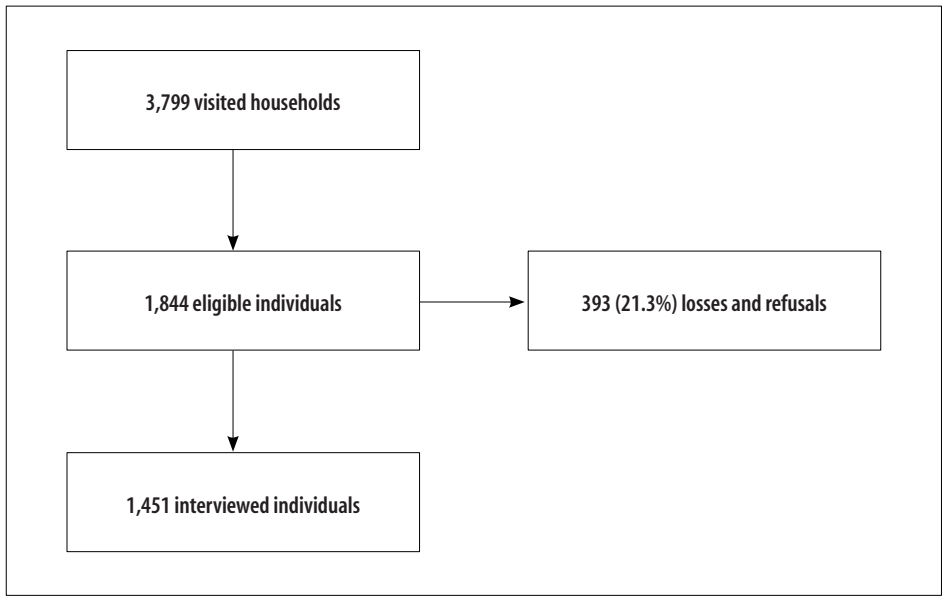

Figure 1 – Description of the process of individuals' inclusion in the study on influenza vaccination in elderly of the municipality of Pelotas, Rio Grande do Sul, 2014

Table 1 – Description of the sample, prevalence of influenza vaccination, crude and adjusted analyses according to demographic, socioeconomic, behavioral, use of health services and health problems characteristics in the elderly population of the municipality of Pelotas, Rio Grande do Sul, 2014

Variables	Total sample	Prevalence	Crude analysis		Adjusted analysis[c]	
	n (%)	(95%CI[a])	PR (95%CI[a])	p-value[b]	PR (95%CI[a])	p-value[b]
Sex[d]				0.813		0.441
Male	537 (37.0)	70.8 (67.1;74.6)	1.00		1.00	
Female	914 (63.0)	71.4 (67.9;74.8)	1.01 (0.95;1.07)		1.03 (0.96;1.10)	
Age[d]				0.451		0.289
60-69	756 (52.3)	69.7 (66.0;73.4)	1.00		1.00	
70-79	460 (31.8)	73.9 (69.3;78.5)	1.06 (0.99;1.14)		1.04 (0.96;1.13)	
80 or over	230 (15.9)	70.6 (63.9;77.3)	1.01 (0.91;1.13)		1.05 (0.94;1.18)	
Skin color[d]				0.132		0.091
White	1,211 (83.7)	72.0 (69.0;75.0)	1.08 (0.98;1.18)		1.10 (0.99;1.21)	
Black/brown/yellow/indigenous	236 (16.3)	67.0 (60.8;73.1)	1.00		1.00	
Marital status[d]				0.028		0.116
With a companion	763 (52.7)	74.0 (70.4;77.7)	1.09 (1.01;1.17)		1.07 (0.98;1.16)	
Without a companion	684 (47.3)	68.0 (63.9;72.2)	1.00		1.00	
Economic status[d]				0.002		0.003
A/B	483 (35.2)	75.1 (71.2;79.0)	1.22 (1.06;1.40)		1.21 (1.05;1.38)	
C	720 (52.5)	70.5 (67.2;73.9)	1.15 (0.99;1.32)		1.12 (0.98;1.29)	
D/E	169 (12.3)	61.5 (54.1;68.9)	1.00		1.00	
Education level (in complete years)[d]				0.135		0.807
0-3	533 (37.1)	68.9 (64.4;73.4)	1.00		1.00	
4-7	445 (31.0)	72.0 (67.9;76.1)	1.05 (0.97;1.13)		1.03 (0.94;1.13)	
8-11	143 (9.9)	73.9 (65.8;82.1)	1.07 (0.95;1.22)		1.03 (0.89;1.18)	
12 or over	316 (22.0)	73.1 (68.4;77.8)	1.06 (0.98;1.15)		1.02 (0.90;1.14)	
Currently employed[d]				0.006		<0.001
No	1,084 (80.4)	72.5 (69.6;75.5)	1.15 (1.04;1.28)		1.19 (1.07;1.32)	
Yes	264 (19.6)	62.8 (56.4;69.3)	1.00		1.00	
Physical activity at free time[e]				0.008		0.037
Minimally active	1,133 (81.5)	70.0 (66.9;73.1)	1.00		1.00	
Active	258 (18.5)	77.5 (72.3;82.7)	1.11 (1.03;1.19)		1.09 (1.01;1.19)	
Smoking[e]				<0.001		0.002
Have never smoked	781 (54.0)	71.4 (67.7;75.2)	1.31 (1.13;1.51)		1.18 (1.01;1.37)	
Former smoker	483 (33.4)	77.2 (73.0;81.4)	1.41 (1.22;1.63)		1.27 (1.10;1.47)	
Smoker	182 (12.6)	54.7 (47.1;62.3)	1.00		1.00	
Alcohol intake[e]				0.245		0.097
No	1,138 (78.8)	70.5 (67.5;73.5)	1.00		1.00	
Yes	307 (21.2)	73.5 (68.4;78.6)	1.04 (0.97;1.12)		1.07 (0.98;1.16)	
Use of health services[e]				<0.001		0.009
No	168 (11.6)	56.6 (48.6;64.5)	1.00		1.00	
Yes	1,281 (88.4)	73.1 (70.2;76.0)	1.29 (1.12;1.49)		1.22 (1.05;1.42)	

Continue on next page

Table 1 – Conclusion

Variables	Total sample	Prevalence	Crude analysis		Adjusted analysis[c]	
	n (%)	(95%CI[a])	PR (95%CI[a])	p-value[b]	PR (95%CI[a])	p-value[b]
Locomotion limitations[e]				0.151		0.361
No	1,410 (97.2)	71.5 (68.7;74.4)	1.22 (0.93;1.61)		2.03 (0.44;9.38)	
Yes	41 (2.8)	58.5 (41.7;75.4)	1.00		1.00	
Overweight[e]				0.264		0.941
No	597 (43.8)	69.9 (65.7;74.1)	1.00		1.00	
Yes	767 (56.2)	72.8 (69.3;76.2)	1.04 (0.97;1.12)		1.00 (0.92;1.08)	
Health problems[e]				<0.001		<0.001
None	200 (13.9)	60.8 (53.8;67.8)	1.00		1.00	
One	433 (30.0)	66.7 (62.0;71.2)	1.10 (0.96;1.25)		1.07 (0.94;1.22)	
Two or more	809 (56.1)	76.2 (72.9;79.6)	1.25 (1.11;1.41)		1.21 (1.07;1.38)	

a) 95%CI: 95% Confidence Interval
b) P-value of Wald test of linear trends for ordinal variables: age, economic status, education level and health problems; Wald test of heterogeneity for the other variables, through Poisson regression for both the crude and adjusted analyses.
c) Hierarchical adjusted analysis for all the variables of the same level and above, with p<0.2.
d) First hierarchical level
e) Second hierarchical level

previous year and had two or more health problems presented higher prevalences of vaccination (Table 1).

In the adjusted analysis, except for the marital status, all the other variables remained associated to vaccination. With regard to economic status, a considerable increase of vaccination prevalence was observed as the status improved (p=0.003). Individuals who were not employed presented higher frequency of vaccination, comparing to those who were employed (PR=1.19; 95%CI 1.07;1.32); the physically active presented a prevalence 9% higher (PR=1.09; 95%CI 1.01;1.19), comparing to those who were minimally active; former smokers showed a vaccination frequency 27% higher (PR=1.27; 95%CI 1.10;1.47) when comparing to current smokers; those who were assisted by a health professional the previous year were vaccinated 1.22 times more (PR=1.22; 95%CI 1.05;1.42), when comparing to those who were not assisted by a health professional; and vaccination prevalence (p<0.001) was higher in individuals with more health problems reported (Table 1).

Among the elderly who were vaccinated in 2013, 98% attended the vaccination campaign, 98% did not pay for the vaccine and 8% mentioned some adverse event within 48 hours following vaccination. Of the total of interviewed individuals, 72% reported having a vaccination card; of those, it was possible to see the document of 64%. The record of the 2013 vaccine was in 86% of the cards (Figure 2).

Figure 3 describes the noncompliance reasons (n=414); the most frequent were: 'did not want/does not like' (45%), 'usually does not catch colds' (17%) and 'fear' (10%). The least mentioned reasons were: 'presented adverse events before', 'forgot/missed the campaign', 'was sick/have allergy', 'the doctor said not to take it' and 'others'.

Among the 83 elderly who reported adverse events caused by the vaccine, 49 had malaise, 30 had muscle ache and 22 local pain/swelling. Respiratory difficulties, fever and other symptoms were the least reported (Figure 4).

Discussion

The prevalence of influenza vaccination in 2013 found in this study was of 71%. Although the prevalence found here was higher than the one found in other population-based studies conducted in Brazil,[11,13,15] influenza vaccination has not universally reached the elderly. According to data from the National Immunization Program (NIP), influenza vaccination coverage in the elderly from Pelotas in the same year (2013) was of 87%.[23] This difference may be initially explained by the fact that it takes into account the rural and urban population and also institutionalized individuals. Another possibility would be the inclusion of individuals who live in other municipalities of the region, whereas the

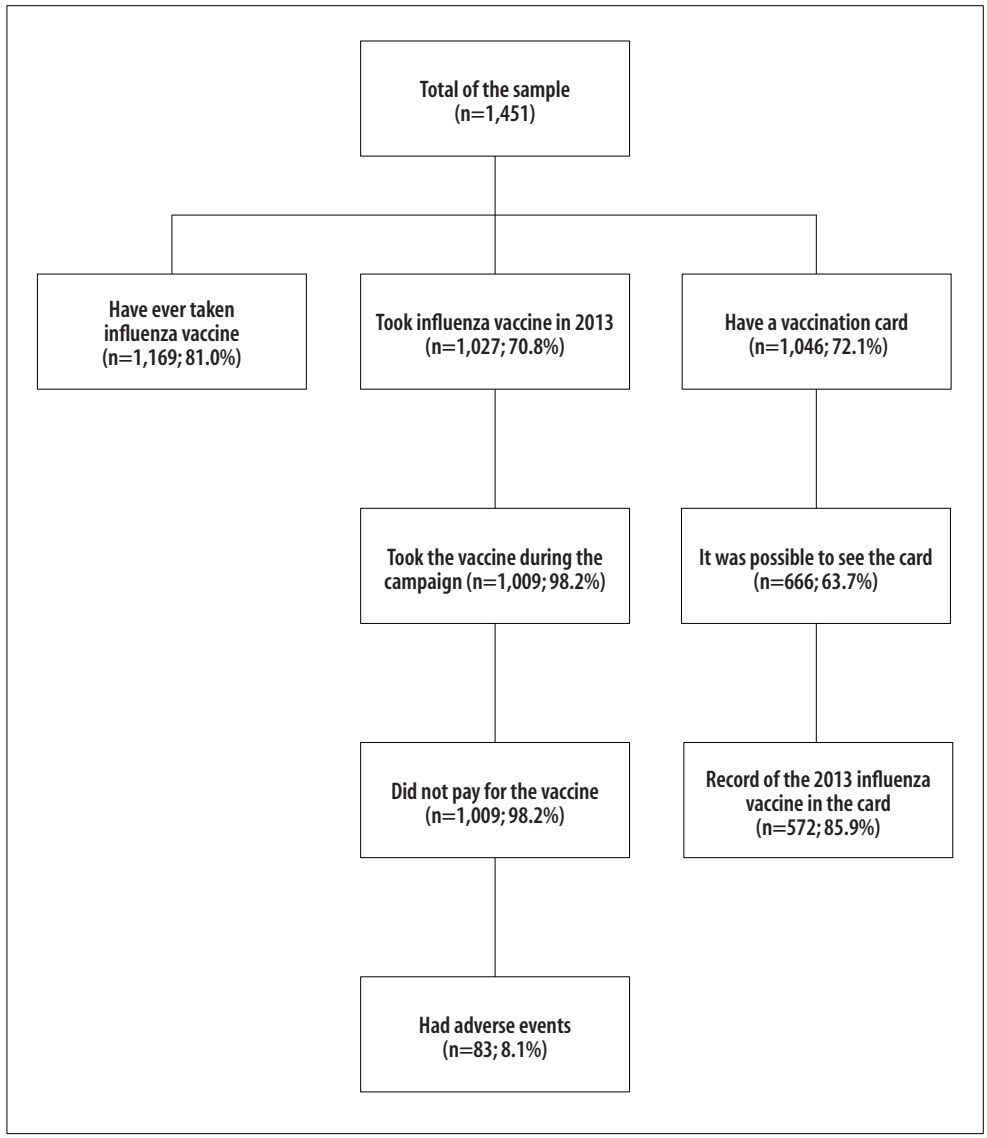

Figure 2 – Prevalence and characteristics of influenza vaccination in elderly (n=1,451) in the municipality of Pelotas, Rio Grande do Sul, 2014

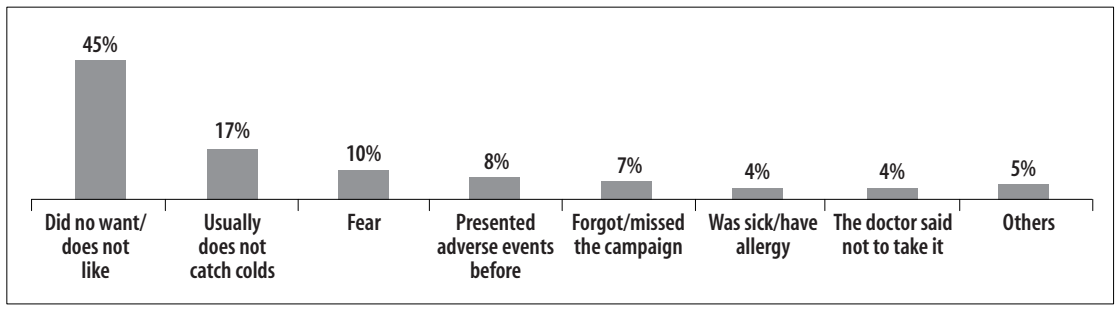

Figure 3 – Reasons for noncompliance of influenza vaccination in elderly (n=414) in the municipality of Pelotas, Rio Grande do Sul, 2014

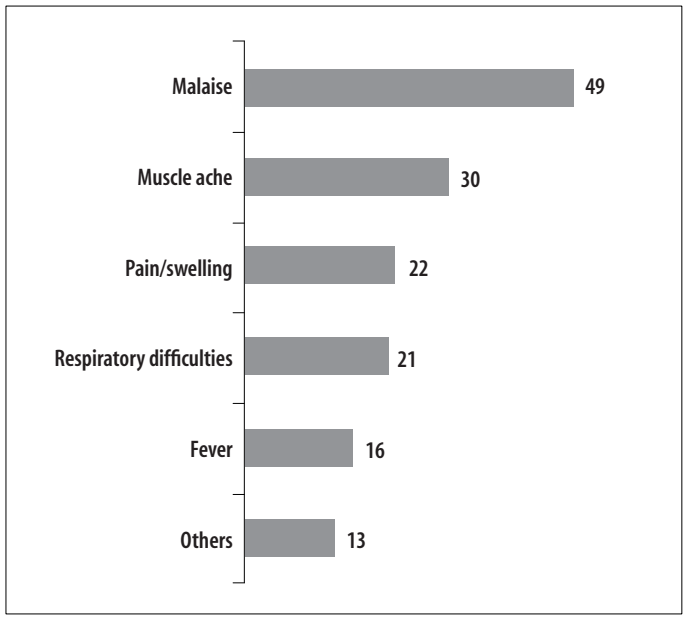

Figure 4 – Absolute number of adverse events in the first two days following influenza vaccination in elderly (n=83) in the municipality of Pelotas, Rio Grande do Sul, 2014

denominator is calculated based on the target-population of the local municipality.[23]

In both the crude and adjusted analyses, sex was not associated to taking the vaccine, as it was showed in other studies,[13,14,17] although women are usually more attentive to signs and symptoms, have higher knowledge on diseases and use more the health services than men.[24]

The lack of association with the age found was different from other reports,[11,15,16] where prevalence was higher among older individuals. In the present study, probably the higher vaccination coverage was responsible for a more homogeneous distribution of the outcome.

Significant difference was not found in the prevalence according to skin color, which is consistent to other Brazilian studies,[12-14] and shows a possible increase in access to health services and reduction of inequalities concerning skin color.[25]

In the crude analysis, marital status was associated to influenza vaccination, whose prevalence was higher among those with a companion. After the adjustment of economic status, this association was lost, possibly meaning that it was a cofounder. Most individuals of classes A and B lived with a companion and were also the most vaccinated individuals (data not presented). Economic status appeared to be a determinant factor in the adherence to the vaccine. A direct relation with the outcome was observed in both the crude and adjusted analyses: elderly individuals with better economic position (A and B) presented higher prevalences of influenza vaccine. It noteworthy that, although the vaccination campaigns are universal, they do not overcome the inequalities of the Brazilian health system,[25] and, once the inequities are proved, the elderly with low income and who are more vulnerable demand higher attention.[24,25]

Although education level may be considered a proxy for socioeconomic situation, their association among the elderly may present some limitations. Education level, which is determined in earlier stages of life, tends to be the same throughout time,[24] reducing its effect on recent outcomes, which is the case of influenza vaccination. This may be the reason of the non-association between education level and economic status in the studied sample.

The elderly individuals who were not employed showed a higher prevalence for vaccination, which may be explained by the longer free time and, consequently, more health care. Vilarino *et al*.[26] identified that the younger elderly, ususally more active and with less health problems, attend less frequently influenza vaccination campaigns.

Some authors have found association between behavioral variables and influenza vaccination.[13,14] People with a healthier lifestyle are likely to be more

cautious and, consequently, take more vaccines. In this present study, the variable physical activities during free time was associated to vaccination, which is consistent to the literature,[12-14] and suggests that health care in interconnected. Reinforcing the self-care attitude, the findings of Vilarino *et al*.[26] showed that the proportion of sedentary elderly was lower among the vaccinated individuals when comparing to those who did not take the vaccine.

No significant differences were observed regarding alcohol intake and overweight, which meets findings pointed in the literature.[11,13,14,16] In this present study, the lack of details concerning the collected information on alcohol intake may explain the results found; with regard to the relation between overweight and vaccination, it needs to be better studied, because it would be expected that non-obese individuals would include vaccination in their health care profile, such as the physically active and non-smokers. Overweight may not be a good behavior proxy as a prevalent factor in the sample.

Locomotion limitation was not statistically associated to vaccination. However, the elderly under those conditions took less vaccine than those who were not bedridden. The statistical difference was probably not found due to the insufficient number of interviewed individuals with this characteristic, increasing the confidence intervals and reducing the estimate accuracy.

The presence of chronic diseases has been considered an important element in the adherence to influenza vaccine.[13,15] The findings of the crude and adjusted analyses showed that, the higher the number of health problems, the higher the prevalence of vaccinated individuals. This may happen because individuals with chronic diseases belong to priority groups for vaccination, not only because they are aged 60 or over, but also because of their health condition, which makes them receive higher attention, since they are a more vulnerable group.[2]

In this sense, being assisted by a health professional the previous year was associated to vaccination, possibly because the elderly are more used to attending health services, have more possibility of receiving health guidance and are more attentive to education recommendations and preventive actions, attending more frequently the vaccination campaigns and adhering to this type of prevention.[14] This association also corroborates with the fact that the more diseases the individual reports, the higher will be the number of appointments with health professionals (data not presented).

When the elderly were questioned about the reasons why they did not take the vaccine, most of them mentioned 'did not want/does not like', which is similar to the results described by Dip *et al*.,[11] according to which, among the non-vaccinated individuals, 83% refused to take the influenza vaccine, maybe due to myths and insecurity that still persist concerning the vaccine, probably because of the low quality of assistance provided by the health system. Health professionals are probably missing the opportunities of adequately guiding the users of health services. According to Francisco *et al*.,[13] receiving guidance by a health professional was the most important factor associated to influenza vaccine.

Among the elderly who took the vaccine, 8% reported at least one adverse event in the first days following vaccination, which is lower than the proportion found by other authors,[11,27] probably because the period concerning adverse events in this present study was of 48 hours following immunization, whereas other studies considered a longer period. Furthermore, the findings by Donalisio *et al*.[27] refer to a study conducted with convenience sampling (elderly who vaccinated in a health care unit) and is not population-based. The most cited events were malaise, muscle ache and local pain/swelling, which are similar to those found in other researches.[27,28]

With regard to the positive aspects of this study, we can highlight the population-based, cross-sectional design, recommended for prevalence studies: its sample allows the extrapolation of data for non-institutionalized elderly of the urban area, making the sample a representation of the target-population.

On the other hand, some difficulties in field work were registered: the survey was conducted in the households, and the individuals may refuse to receive the interviewer due to suspicion or fear. Besides that, most of the elderly have shown autonomy to perform their activities, and as a result, some of them were not found at home. These factors probably explain the high percentage of losses and refusals (21.3%).

One of the possible limitations of this study is the recall bias. As the outcome question was related to the previous year, the elderly may have presented difficulties remembering past events. Regardless of that, a validation study showed that the self-report of influenza vaccination in this group of individuals is highly sensitive,[29] and we

can suppose that the outcome estimate is adequate. Although it was possible to check the vaccination card of 64% of the individuals, some differences between the individuals who presented the card and those who did not present it could be observed. Thus, we chose to use the self-report data, which was validated and offered information for the total sampling.

In spite of the evidence towards the vaccine benefits and the existence of annual campaigns for the elderly since 1999, we can observe that, in Brazil, there are still some barriers that avert the vaccination to achieve all the elderly population. An important finding in this study is that 19% of the elderly have never taken influenza vaccine. When extrapolating this proportion for the target-population, we have a total of 8,759 elderly in the urban area of Pelotas who are not part of this important immunization strategy.

On the above, we can conclude that the influenza vaccine has not universally reached the elderly. Socioeconomic inequalities, characteristics of the use of health services and behavioral factors are determinants for the adherence to vaccination. It is possible that health education does not reach all this population group, taking into consideration the reasons pointed by the elderly for not taking the vaccine, such as fear and the fact of not wanting or not liking the vaccine. Therefore, health professionals have a fundamental role in the recommendation of the vaccine, settling misconceptions and elucidating controversial questions related to the efficacy and adverse events, and showing the benefits to health that can be achieved by the influenza vaccination.

We recommend the conduction of future studies of qualitative analyses, dedicated to the investigation of contextual factors capable of influencing noncompliance to the vaccine, providing subsides and guidance to planning management for actions and incentive to vaccination of the elderly population, reinforcing the role of the Brazilian National Health System, responsible for the free vaccination of 98% of the elderly Brazilians. We believe that the control of vaccine-preventable diseases will only be achieved when the vaccine coverage reaches homogeneous indexes for all the population subgroups, in levels considered good enough to reduce morbidity and mortality due to these diseases.[30]

Authors' Contributions

Neves, RG contributed to the conception and design of the study, analysis and interpretation of data, and manuscript's drafting.

Duro SMS and Tomasi E contributed in the conception, interpretation of results and relevant critical review of the intellectual content of the manuscript.

All the authors have approved the final version of the manuscript and declared to be responsible for all the work aspects, ensuring its accuracy and integrity.

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