

Current Immunization Status and Barriers to Immunization in the Elderly Population of the Second most Developed Region of Colombia, South America

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Abstract

Background: Vaccines have been a very effective measure to decrease morbidity and mortality in children, but aren't appreciated for the elderly. Among older adults there're insufficient coverage and misinformation about vaccines, which contribute to a low immunization rate for this vulnerable population. There're issues regarding patients, doctors and health insurances that contribute to the problem. This study evaluated seniors' immunization status and identification of immunization barriers.

Methods: This is an observational, cross-sectional study that included an evaluation of immunization campaigns, surveys to doctors and seniors. The information obtained was compared to national and international guidelines.

Results: Seniors aren't included in the national immunization campaign and the only source of getting informed is only through doctors' and not any other health care provider. As per seniors' answered, the most frequently applied vaccine was influenza but they recognized pneumococcal as most beneficial. More specialized doctors prescribed fewer vaccines; but when recommended, patients followed suggestions 90% of the time. However, of the prescriptions made, 1/3 was denied payment by health insurers. Most of the people don't know about vaccines for the elderly; therefore they don't seek information about it. This creates a vicious cycle in which patients don't know doctors don't prescribe and health insurers deny vaccines, generating a low immunization status in the elderly.

Conclusion: This tendency exposes the way doctors are being trained to cure diseases rather than to prevent them, being more evident among the more specialized doctors. Public advertisement should be made, so general public as well as doctors gets informed and don't limit the information only to the doctor-patient encounter. Vaccines for the elderly should be free or at very low cost so health insurers don't interfere with immunization and don't affect this vulnerable population. Of all the barriers identified, doctors' lack of recommendation appeared to be the major one.

Keywords: Vaccination; Older adult; Barrier; Vaccine; Immunization

Abbreviations: CDC: Centers for Disease Control and Prevention; CG: Colombian Government; PAI: Expanded Program of Immunization; WHO: World Health Organization.

Background

Vaccination is an effective preventative measure [1] and an adequate scheme of immunization in people older than 65 years old can reduce morbidity and mortality [2]. Elderly population (65 years and older) are excluded from national immunization programs in Colombia [3], in terms of prevention and promotion of specific vaccines. These vaccination programs were developed according to the World Health Organization (WHO) recommendations for Latin America that includes Colombia, but the elderly aren't treated as a target in the suggested campaigns, even though they are mentioned as an at-risk population [4]. It is believed that the problem is not exclusively of Colombia but is, rather, worldwide, with a major impact in developing countries due to the fact that there're limited resources [5] and so, prioritizing programs for children.

The Colombian Government (CG) documented that health-associated costs have been increasing [6], consistent with the demographic transition towards more ageing population, according to the World Bank in 1960 life expectancy in Colombia was 54.42 years and 50 years afterwards, in 2010,

it increased to 72.623 years, with a total population older than 65 years old of 4.985% and 7.627% in 1960 and 2010 respectively. Most elderly people have comorbidities, which mean that preventing a disease or conserving an adequate level of health would be of major importance for this population. In Colombia, as well as in many Latin-American countries, there's no concept of "Primary Care Physicians" or "Family Medicine" because anyone who graduates from medical school can practice as a "general doctor".

Additionally, there are constant updates to vaccine recommendations and new vaccines are constantly being introduced [7], as a consequence it is hard for doctors, health insurers, older people and even the CG to keep up with this information and to know which vaccines are suggested for senior citizens and when they should be applied [8]. Additionally, health insurers do not pay for the complete immunization scheme and there's lack of financing from the CG, so if an individual gets informed about the vaccines needed, they would have to pay for the vaccines out of their salary, pension or savings.

Considering that, in August 2014 for Colombia the average cost for the recommended vaccines was: Tdap 81,000 pesos (US \$42.13); pneumococcal (PCV13) 195,000 pesos (US \$101.43); Herpes zoster 270,000 pesos (US \$140.44) and influenza 33,500 pesos (US \$17.43) with a total cost of 579,500 pesos (US \$301.43) [9] and a corresponding monthly minimum wage at the time of 616,000 pesos (US \$320.32) [10]. Therefore is unconceivable that a person who lacks a prevention culture would destine their salary to pay for vaccines. For many elderly, the situation gets more complicated because they don't receive a salary since they are retired, and working options for seniors in Colombia are extremely limited.

On the other hand, in Colombia there're regulations that prohibits mass media communication regarding vaccines [11], which creates a barrier for informing the population, leaving the encounter with a doctor the only way to get informed and neither nurses, pharmacists or other health care providers gets involved. This means that general doctors should inform and update patients about immunization schemes during the patient encounter and not exclusively treat the present illness. Therefore, additional to the economical barrier, doctor's lack of recommendation contributes to the problem.

The Infectious Diseases Association of Colombia in their journal *INFECTIO* established a guideline for vaccination [12], based on the recommendations from the Centers for Disease Control and Prevention (CDC) regarding which vaccines a person aged over 65 years should receive [13]. Diphtheria, Tetanus and Pertussis acellular (Tdap), pneumococcus (PPSV-23 and/or PCV-13), Herpes zoster and influenza (flu) are the vaccines recommended for the elderly population (Table 1). The CG doesn't follow these recommendations since they only include influenza vaccine in their immunization campaigns, therefore, contributing to the low rate of immunization of the elderly population and placing older people at risk of immune preventable diseases.

The immunization programs in Colombia are based on the Expanded Program of Immunization (PAI), which indicates a specific vaccination scheme according to each age group. For the elderly population, the CG haven't included any recommendations, which means that for this upper-middle-income economy, the primary endpoint of vaccination is to influence infant mobility and mortality rather than benefiting the entire population. Currently the only vaccine the CG will would pay for the elderly population is influenza [13], which demonstrates the insufficient vaccination programs, their exclusion from national immunization campaigns and the insensitivity towards the importance of a complete immunization scheme.

Finally, although vaccines in the elderly don't have the same efficacy as in children [14], older people do benefit from them. However, there are social myths and beliefs about vaccines in adults, for example thinking that the influenza vaccine causes sickness rather than preventing it [14,15].

Data Collection

Study subjects and study size

This is a community-based, observational, descriptive, cross-sectional study that was in accordance to the Declaration of Helsinki and accepted

by the Institutional Ethical Committee of CES University. The study took place in the second most developed region of Colombia, the Metropolitan Area of the Aburrá Valley. It is made up of ten municipalities, with an estimated population of 3821797 habitants [16] and 451.320 people older than 65 years (11,8 %) and 4517 doctors (0.12%) (General, specialized and subspecialized).

The Fleiss formula calculated the study size for the population that probabilistically represented populations, elderly people and doctors (general, specialized and subspecialized). The study evaluated the immunization campaigns for Metropolitan Area of the Aburrá Valley through two surveys: doctors and older adults, with a total of 847 surveys made (408 and 439 respectively). Survey response rate was 90%; therefore, a 10% of more surveys were made in order to achieve the significant number that represented appropriately the population. Each survey was public directed with questions about knowledge of vaccines and perceived immunization barriers for the elderly population. Among the questions for doctors it included level of training, perception of effectiveness of vaccines in the elderly, perception of the possible barriers for immunization, their experience with health insurers, attendance to training in the last year regarding the elderly population and the application of the annual influenza vaccine. In regards to the elderly population questions included education level or academic degrees, source of incomes, perception of vaccines and their effectiveness in adults, what have been their barriers for immunization, recent immunization and their inclusion in national immunization programs [17].

Inclusion and exclusion criteria

The inclusion criteria for the sample of adults 65 years and older were: not being hospitalized at the time, not having any apparent neurological deficits measured through Mini-mental evaluation, and acceptance of the written consent. The inclusion criteria for doctors' (General, specialized, subspecialized) was: having patients of 65 years and older on a regular basis and acceptance of the written consent.

Results

The information obtained from the surveys was compared to national and international guidelines regarding the vaccines a person older than 65 years should receive and when these vaccines should be applied.

Older adults surveyed

Relevant information of the demographics of the people studied is showed in the table 2, however, is important to point out the majority of the elderly people stated they subsisted on economical support from their families and only 38% had a retirement pension.

Among those people who had any level of education in comparison who didn't, there was a significant difference found through chi-squared test ($p=0,002$) towards wanting to get vaccinated because of perception of beneficial, tendency that was reflected on the higher vaccination rate on the educated population in comparison to people that didn't received any education, 61.3% vs 51.2% respectively. 54.2% of the adults said they knew of at least one vaccine for the elderly and the vaccine they mentioned based on their perception as being most beneficial was pneumococcus

Vaccine for the elderly population	Diphtheria, Tetanus and Pertussis acellular (Tdap)	Pneumococcus (PPSV-23 and/or PCV-13)	Herpes zoster	Influenza (flu)
Recommendations of CDC	✓	✓	✓	✓
Recommendation of Infectious Diseases Association of Colombia	✓	✓	✓	✓
Vaccines covered and included in the Colombian Government immunization campaigns for elderly population	x	x	x	✓

Table 1: Vaccines for the elderly population and comparison among the different recommendations. CDC recommendations are included as a guideline since they are the worldwide reference.

(PPSV-23 and/or PCV-13), followed by the influenza and tetanus vaccines. Vaccination in the elderly in the last year reached 60.8%, mostly due to influenza followed by tetanus and pneumococcus (PPSV-23 and/or PCV-13), as seen in table 2.

Of the total sample of surveyed adults, 89.7% reported they have never received any recommendations regarding vaccines during their regular medical appointments. Of the 10.3% of elderly adults that did receive information about vaccines, they reported that they followed their doctors' suggestions 90% of the time. With regards to the specific barriers

Demographics of the elderly Colombian population surveyed			
		Current or Previous Profession or Occupation	
Sex		Health related	12
Male	153	Construction	28
Female	284	Education	12
		Security/Military	7
		Economy/Administration/Merchant	57
		Housewife	124
		Other	159
Age		Nothing	108
65-70 years	153	Vaccination in the last year	
70-75 years	105	Yes	267
75-80 years	76	No	172
80-85 years	61	When vaccinated, which vaccines did they received?	
85-90 years	31	Flu	258
>90 years	13	Tetanus	25
Education Level Completed		Pneumococcus (PPSV-23and/or PCV-13)	21
Primary	248	Yellow Fever	15
High school	103	Hepatitis	3
Technical/Technological	44	Measles, Rubella, Mumps	1
University	1		
Nothing	43		

Table 2: Relevant information of demographics of the elderly people who was surveyed.

for vaccination in the elderly population, only 19.9% of older adults said they feared the adverse effects of vaccines; 15.5% didn't believed in the effectiveness of vaccines; 13.9% thought vaccines sicken rather than prevent disease; and 9.8% expressed that they believed that vaccines interfered with their existing medication (Figure 1).

Upon further statistical analyses and using the chi-square test, a direct relationship towards level of education and increased rate of vaccination was found to be significant. This was supported by the results that had a higher rate of immunization and a better perception of vaccines resulted in the more educated sample of the population. Finally, elderly people that had been vaccinated stated that they have adopted other preventative measures in order to ensure a healthy lifestyle. Therefore, the concept of healthy habits it's already there but should be reinforced.

Doctors surveyed

74.8% of the doctors surveyed worked as general doctors; 20.6% were specialists and 4.7% were subspecialists as seen in the table 3. From the total number of doctors 55,1% reported being vaccinated with the annual influenza vaccine (2015) recommended for all the population regardless of their area of expertise or their age, 4.7% stated that they believed vaccines are ineffective in the elderly and 1.2% expressed that they were oblivious to which vaccines were recommended for the elderly.

Doctors' ranked the vaccines in what they considered the order of importance for an elderly patient and results were: influenza (94.1%), pneumococcus (PPSV-23 and/or PCV-13) (45.8%), Herpes zoster (5.5%) and Tdap (0.7%). Furthermore, 27.5% expressed that health insurers denied payment for vaccine prescriptions and 14.5% stated they stopped recommending vaccines for elderly people due to the fear of adverse effects. Of the doctors that said they recommended vaccines, the majority (77.9%) were working as general doctors. Finally, there was a direct correlation between had attended a conference on issues affecting elderly adults and recommending vaccines: 38.8% vs. 18.8%.

Finally, when asked doctors about vaccines for the elderly less than 1% of knew the complete immunization scheme of the recommended vaccines for adults older than 65 years; this refers to seasonal influenza (flu) vaccine, pneumococcus (PPSV-23 and PCV-13), Herpes zoster and

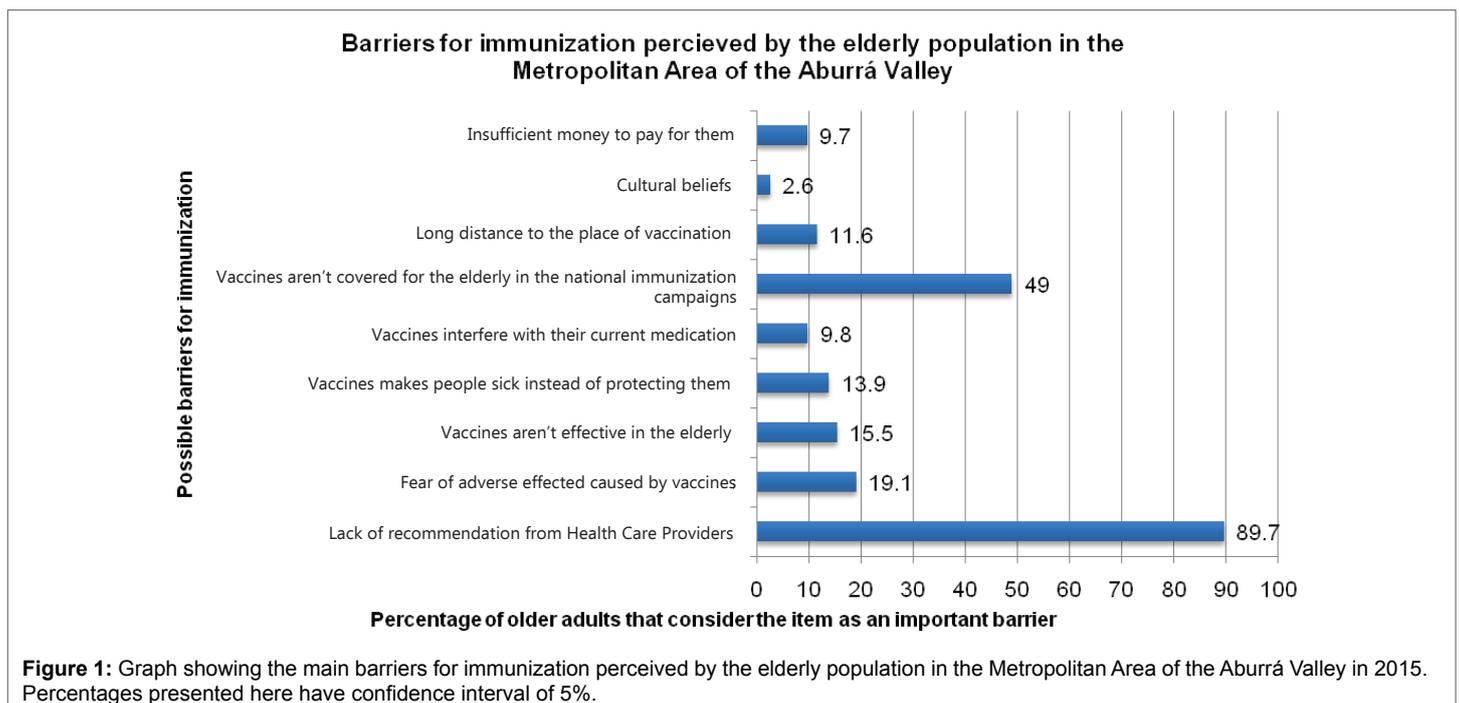


Figure 1: Graph showing the main barriers for immunization perceived by the elderly population in the Metropolitan Area of the Aburrá Valley in 2015. Percentages presented here have confidence interval of 5%.

Demographics of doctors from the Colombian population surveyed			
		Age	
Sex		20-30 years	142
		30-40 years	142
Male	233	40-50 years	49
Female	275	50-60 years	54
		60-70 years	20
		70-80 years	1
Level of training		Recommendation of vaccines	Vaccinated with the annual influenza vaccine
General doctors	305	78.69%	47.62%
Specialist	84	65.48%	44.27%
Sub-specialist	19	63.16%	42.11%

Table 3: Relevant information of demographics of the doctors' population surveyed.

Diphtheria, Tetanus and Pertussis (Tdap). Of the total doctors surveyed, only 1% recommended Tdap, 5.5% mentioned Herpes zoster, 45.8% included pneumococcus (PPSV-23 and/or PCV-13) and the majority, 94%, reported recommending annual influenza vaccine (flu). However, the data from the elderly suggests a lower rate of recommendation, which could be a reflection of both a good perception of health of older adults and a contrived and speculated answer so doctors didn't had to accept their lack of knowledge.

Discussion

Vaccines are not widely recognized as a preventive health measure by the elderly population or health care providers, even when vaccines have demonstrated effectiveness for this population [18]. Consistent with the findings of this study which showed that the majority of the elderly lacked a complete immunization scheme and less than 1% of the doctors surveyed knew about it.

On the other hand, is alarming that within the sample of doctors only 55% had received the annual influenza vaccine, since this is a worldwide recommendation for every health care provider, not only for their own safety but also for their patient's protection too. There is an inverse correlation with the level of training of doctors and their likelihood to recommend vaccines, update the patient's immunization scheme, provide a prescription for vaccines or even get immunized. As showed in the results, general doctors had a higher likelihood to recommend vaccines and to get immunized.

Nevertheless, the fact that there're constant updates regarding vaccines highlights the importance of public communication about vaccination, and so CG should modify regulation, allowing messages to reach both patients and doctors. Promoting mass media communication would not only create a preventive culture adopting vaccines as an important message but will also optimize the patient-doctor encounter and long term could contribute to decreasing immune preventable diseases and colonization of such agents.

Knowledge of vaccines is deficient amongst the elderly, not only due to lack of identifying which vaccines should be applied but also the reasons and benefits of them. The idea of being vaccinated comes entirely through the doctors' recommendation, but in most patient-doctor encounters doctors' usually focus on the present illness, missing the opportunity to inform patients about vaccines. This worsens by the fact that health insurers deny payment for vaccines and consequently doctors' stop recommending them. However, this creates a huge opportunity for improvement and implementation of innovative tools to help remember vaccines for the elderly such as checklists, questionnaires prior the encounter and/or the use of a vaccination card for the elderly. Also, create educational programs

for every doctor regarding vaccines through a course, monthly meeting or informational flyers. Special emphasis should be given to the vaccines of Herpes zoster and Diphtheria, Tetanus and Pertussis acellular (Tdap) since knowledge of these vaccines was reported to be less than 5% from the doctor's sample. Therefore, next steps in the study could evaluate the implemented strategies and reevaluate both populations.

In conclusion, the fear of adverse effects of vaccines, the distance to the place of vaccination and the price of vaccines don't seemed to be important barriers for immunization, rather, the most important barrier for immunization was the doctor's lack of recommendation and the patient's lack of awareness regarding the importance of being immunized. Therefore, the most significant intervention would be towards education, especially for the health care providers.

Finally, this study is limited in the way that it only included two populations, but the problem and consequently the solution, involves more entities such as patient's family, nurses, physician assistants and other health care providers. Evaluating other target population could characterize more accurately the situation and solutions could be implemented simultaneously, improving overall patient's health and the quality of the service. Nevertheless there are no similar works or investigation in the literature that contextualize the situation and identifies barriers and correlates knowledge between doctors and patients regarding vaccines. Additionally, Colombia's situation could be a reflection of what happens in most Latin American countries since barriers and difficulties might be similar throughout South America because the context, culture and political organization is closely similar regardless of the nationality. The findings are important in the sense that finding an appropriate solution and implementing new strategies can allow other countries to adopt them and benefit from them, and improving overall Hispanic's quality of life.

Conclusion

The majority of the elderly population from Colombia is adopting a preventive culture but there are serious limitations in access that resulted in exclusion of vaccines. There are not only barriers for acquiring vaccines but restriction in getting informed mainly because the only source is through doctors' recommendation and not any other health care provider or any mass media communication since it is regulated by the national law.

In conclusion, based on the doctor's response, approximately one third of prescriptions were denied payment by the health insurers which contribute to the vicious cycle that ends up in a low immunization rate in the elderly population which is equally affected by doctor's lack of recommendation and patients not inquiring about vaccines.

As per the study, the most important barrier for immunization identified was the doctors' lack of recommendation, updating and informing patients about vaccines. General doctors appreciate and adopt preventative habits more than other trained doctors; this is shown through their higher rates of recommending vaccines for the elderly and getting immunized for the annual influenza vaccine. Results showed that this relationship tend to decreased as the level of training increased, tendency exposes the way doctors are being trained to cure diseases rather than to prevent them.

Declarations

- The Institutional Committee of Ethics of CES University approved the investigation with the reference number 412 signed on the 12 of May of 2015.
- We consent to publish the data from the participants and publication of the following manuscript.

- The datasets during and/or analyzed during the current study available from the corresponding author on reasonable request.
- There is not a competing interest to declare. The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.
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Author's Contribution

- Carolina Velez-Mejia: substantial contribution in the conception and design, analysis and interpretation of the data.
- Juan D. Velez-Londoño: substantial contribution in drafting the article and revising it critically for important intellectual content.
- Doris Cardona-Arango: substantial contribution in the conception, design and drafting the article.
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