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Review

The public health value of vaccination for seniors in Europe

Susanna Esposito^{a,*}, Elisabetta Franco^b, Gaetan Gavazzi^c, Angel Gil de Miguel^d, Roland Hardt^e, George Kassianos^f, Isabelle Bertrand^g, Marie-Cécile Levant^g, Benoit Soubeyrand^g, Jose Antonio López Trigo^h

^a Pediatric Clinic, Department of Surgical and Biomedical Sciences, Università degli Studi di Perugia, Perugia, Italy

^b Dipartimento di Biomedicina e Prevenzione – Università Degli Studi di Roma Tor Vergata, Roma, Italy

^c Université de Grenoble-Alpes et GREPI, Clinique universitaire de médecine gériatrique, CHU de Grenoble, La Tronche, France

^d Catedrático de Medicina Preventiva y Salud Pública, Universidad Rey Juan Carlos, Madrid, Spain

^e Department of Geriatric Medicine, St. Hildegardis-Hospital, Mainz, Germany

^f Royal College of General Practitioners Immunisation Lead, President British Global & Travel Health Association and General Practitioner, Bracknell, UK

^g Medical Affairs, Sanofi Pasteur MSD, Lyon, France

^h Spanish Society of Geriatrics and Gerontology President, Committee Member Vaccines of SEGG, Malaga, Spain

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ABSTRACT

Longer life expectancy and decreasing fertility rates mean that the proportion of older people is continually increasing worldwide, and particularly in Europe. Ageing is associated with an increase in the risk and severity of infectious diseases. These diseases are also more difficult to diagnose and manage in seniors who often have at least one comorbid condition (60% of seniors have two or more conditions). Infectious diseases increase the risk of hospitalization, loss of autonomy and death in seniors. Effective vaccines are available in Europe for infectious diseases such as influenza, pneumococcal diseases, herpes zoster, diphtheria, tetanus and pertussis. Their effectiveness has been demonstrated in terms of reducing the rates of hospitalization, disability, dependency and death. The prevention of diseases in seniors also results in savings in healthcare and societal costs each year in Europe. Despite the availability of vaccines, vaccine-preventable diseases affect millions of European citizens annually, with the greatest burden of disease occurring in seniors, and the medical and economic benefits associated with are not being achieved. Vaccination coverage rates must be improved to achieve the full benefits of vaccination of seniors in Europe.

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Contents

| | |
|--|----|
| 1. Introduction | 00 |
| 2. Burden of vaccine-preventable diseases in seniors in Europe | 00 |
| 2.1. Influenza | 00 |
| 2.2. Pneumococcal diseases | 00 |
| 2.3. Herpes zoster | 00 |
| 2.4. Diphtheria | 00 |
| 2.5. Tetanus | 00 |
| 2.6. Pertussis | 00 |
| 3. Medical rationale for vaccinating seniors in Europe | 00 |
| 4. Economic rationale for vaccinating seniors in Europe | 00 |

* Corresponding author.

E-mail addresses: susanna.esposito@unimi.it (S. Esposito), franco@med.uniroma2.it (E. Franco), GGavazzi@chu-grenoble.fr (G. Gavazzi), angel.gil@urjc.es (A.G. de Miguel), hardt@kkmainz.de (R. Hardt), gckassianos@btinternet.com (G. Kassianos), isabelle.bertrand@sanofi.com (I. Bertrand), mariececile.levant@sanofi.com (M.-C. Levant), benoit.soubeyrand@sanofi.com (B. Soubeyrand), joselopeztrigo@gmail.com (J.A. López Trigo).

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| | |
|---|----|
| 5. Vaccine recommendations and vaccination coverage rates in seniors in Europe: a need insufficiently taken in charge | 00 |
| 6. Discussion and conclusions | 00 |
| Acknowledgement | 00 |
| Funding | 00 |
| Conflicts of interest | 00 |
| References | 00 |

1. Introduction

Longer life expectancies and decreasing fertility rates mean that the proportion of older people in the populations of Organisation for Economic Co-operation and Development (OECD) countries is continually increasing [1]. Although populations are ageing in most countries worldwide, the speed is particularly fast in the European Union. In this region, the proportion of the population aged ≥ 80 years has increased from 1.5% in 1960 to almost 5% in 2010, and it is estimated that it will rise to 11% by 2050 [1]. The pressure that this growing population of seniors will put on long-term care systems will depend on their health status. Since the proportion of the economically active population that contributes financially to society is expected to fall, the financing of social protection systems, including healthcare will become challenging. In 2012 there were 4.2 working-age people (15–64 years) for every person aged ≥ 65 years in the OECD countries. Over the next 40 years it is estimated that this ratio will halve to an average of 2.1.

Vaccination is a critical component of infectious diseases preventive strategies for individuals of all ages. In children the burden of infectious diseases is high because they are exposed to a biological environment that is completely new for them. In the absence of vaccination, this natural exposure to infectious agents is the only way to prime the immune system. In contrast, the high burden of infectious diseases in elderly, usually defined as those aged ≥ 65 years, results from the age-related decline of the immune system, leaving them more vulnerable to infectious diseases. Vaccination at this age aims mainly to boost specific immunity that has been acquired in the past either through vaccination (e.g. tetanus or diphtheria) or natural exposure (e.g. influenza or varicella zoster virus). Vaccination is not only an essential tool in the control of infectious diseases and their costs, it is also pivotal component of a healthy ageing strategy that will contribute to the reduction of the increasing burden of ageing on healthcare systems and the society.

Vaccine-preventable diseases in seniors (i.e., people ≥ 65 years) in Europe represent a substantial burden despite the availability of vaccines. In Europe, vaccination programs for seniors are heterogeneous and vaccination coverage rates remain insufficient although there are convincing evidence-based medical and economic rationales. In this paper we present the burden of vaccine-preventable diseases in seniors in Europe and summarize the potential public health benefits of vaccination strategies for these subjects. Emphasis is given to the three vaccine-preventable diseases with the highest burden in elderly (i.e., influenza, pneumococcal diseases, herpes zoster) and then diphtheria, tetanus and pertussis have been discussed.

2. Burden of vaccine-preventable diseases in seniors in Europe

Although effective vaccines are available for vaccine-preventable diseases like influenza, pneumococcal diseases and herpes zoster, millions of European citizens develop these diseases every year, with the greatest burden of disease occurring in those ≥ 65 years [2]. Influenza and pneumonia are the leading cause of infectious morbidity and mortality in elderly [3,4].

2.1. Influenza

In Europe, influenza occurs in regular epidemics in the winter season. Annual influenza epidemics can be associated with high morbidity and mortality. Severe illness and complications are more common in seniors than other age groups [3,5]. Among the elderly, the death rate frequently increases sharply above the normal expected level of mortality during the winter season. About 5–20% of the global population is affected by seasonal influenza each year [6]. In the 31 countries of the European Union/European Economic Area (EU/EEA), with a population of 500 million people this equates to about 25–100 million people affected [7,8]. Approximately 38,500 deaths are estimated to occur each year in the EEA countries with 90% occurring in seniors [3,7]. In France, during influenza 2014–15 season, there were about 2.9 million medical consultations, 30,000 emergency room visits and more than 3100 hospitalizations (47% in patients aged ≥ 65 years) for influenza or influenza-like-illness. Overall there was an excess of 18,300 all-cause deaths, with 90% in patients aged ≥ 65 years [9]. A similar trend was observed in most EU countries [9]. Data from the United States (US) show that influenza accounts for more than three-quarters of incident vaccine-preventable diseases in senior, and for half of the healthcare costs for vaccine-preventable disease [10].

2.2. Pneumococcal diseases

Pneumococcal diseases are caused by *Streptococcus pneumoniae* bacteria, sometimes referred to as pneumococcus. One of the diseases caused by pneumococcus is pneumococcal pneumonia, which has the highest mortality rate among vaccine-preventable diseases. Although pneumococcal pneumonia is the most common presentation in adults, serious complications such as meningitis and bacteremia can more frequently occur in older adults. In 2014, 17,528 confirmed cases of invasive pneumococcal disease were reported by 28 EU/EFTA countries [11]. The age-specific incidence rate of invasive pneumococcal disease was highest in these aged ≥ 65 years with 13.8 confirmed cases per 100,000 population, followed by children aged < 1 year with 11.3 confirmed cases per 100,000 population. Pneumococcal infections were reported to account for 12–68% of community-acquired pneumonia (CAP) in 13 European countries, or 0.4–2.3 million of the estimated 3.37 million cases of CAP [4,12]. In the European Union, every year 20 to 50% of patients with CAP are hospitalized, representing about 1 million hospitalizations per year [4]. Mortality rates have been estimated to range from 6.4 to 40% in different settings which equate to an estimated 26,000–920,000 deaths annually in the European Union [4].

Pneumococcal resistance to antibiotics is generally increased, i.e. penicillin resistance has increased from 8% in 2012 to 11% in 2014 in Europe [11]. In 2014, the prevalence of antibiotic resistance varied between countries, with the highest prevalence reported by Italy (erythromycin: 28.0%), Poland (penicillin: 28.3%), and Spain (cefotaxime/ceftriaxone: 12.5%).

In addition, co-infections of pneumococcus with influenza are frequent. For example, one review reported that 35% of patients hospitalized for influenza were also infected with pneumococcus [13].

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