

**Seasonal Influenza Vaccination:  
Public Health Benefits of Immunization in Non-  
Communicable Diseases**

*Implications for Policy*

*White Paper*

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## **INTRODUCTION**

Non-communicable diseases (NCDs) impose a huge burden on global health. Indeed, NCDs are the leading cause of death worldwide, accounting for 36 million of the 57 million deaths in 2008, principally due to cardiovascular diseases, diabetes, cancers and chronic respiratory conditions. Perhaps unexpectedly, nearly 80% of deaths from NCDs are in low- and middle-income countries, and approximately one quarter of global NCD mortalities occur in those aged under 60 years old. Deaths in this younger group are more common in low- and middle-income countries, where they account for 29% of NCD mortalities, compared with 13% in countries with high income [WHO 2011]. In addition to their impact on health, NCDs impose a significant economic burden, which is expected to grow substantially over the coming years. Estimates suggest NCDs will cost over \$30 trillion during the next 20 years, and push millions of people into poverty [Bloom et al. 2011].

Despite these alarming statistics, a large proportion of NCDs can be prevented by reducing key risk factors, notably tobacco use, physical inactivity, harmful alcohol use and unhealthy diet [WHO 2011]. WHO estimated that eliminating known major causes of NCDs would prevent at least 80% of all heart disease, stroke and type II diabetes and more than 40% of cancer [WHO 2005a]. That said, efforts to combat NCDs should also aim to protect those who already suffer from these conditions, particularly against the increased levels of illness, disability and death that can be caused by communicable diseases such as influenza. Indeed, a number of common NCDs, such as chronic heart and lung conditions and diabetes, increase the risk of serious illness and mortality due to influenza [WHO 2005b]. This paper explores the health, well-being and financial impact of influenza on those with chronic conditions, including in the elderly, and the benefits immunization may offer.

## **IMPACT OF INFLUENZA**

Seasonal influenza affects people of all ages, and can result in severe illness or death in higher-risk populations. WHO estimates influenza is responsible for 3 – 5 million cases of severe illness and 250,000 – 500,000 deaths annually [WHO 2009]. In the US alone, influenza has been associated with an average of 226,000 hospitalizations each year [CDC, 2010]. Unsurprisingly, influenza also has significant economic consequences. In Europe, the Commission estimates the cost could be between €5.9 billion and €27.7 billion per year [Commission of the European Communities 2009], while in the US the overall burden may be over \$87 billion annually [CDC 2010].

### **Impact of influenza on non-communicable diseases**

People with chronic conditions, such as heart, lung, kidney, liver, blood or metabolic diseases and those with weakened immune systems, comprise a key group at highest risk of complications from influenza [WHO 2009]. Influenza-related serious illness and death occurs most frequently in a number of groups, including those with NCDs such as cardiovascular and pulmonary disease and diabetes [WHO 2005b]. In the US, peak months of mortality for ischemic heart disease, cerebrovascular disease and diabetes mellitus have been found to coincide appropriately with peaks in pneumonia and influenza [Reichert et al. 2004]. Overall, influenza infection in patients with specific NCDs can highly negatively impact their outcomes.

### **Impact of influenza in the elderly**

Older populations suffer a particular burden from NCDs, with roughly three-quarters of deaths from these conditions occurring in those aged 60 and above [WHO 2011]. A number of NCDs are major risk factors for influenza complications, and the elderly suffer more frequently from serious illness and death from influenza. Indeed, the elderly and other high-risk groups account for over 90% of deaths attributed to influenza and pneumonia [WHO 2005b]. In the US, estimated influenza-associated pulmonary and circulatory death rates were over 160 times higher in those aged 65 and older than in people aged 0 - 49. The elderly are also at higher risk of influenza-related hospitalization [CDC 2010].

Understandably, much attention is focused on these acute effects of influenza. However, the risk of poor patient outcomes can continue post-infection. Among the elderly who survive influenza, a proportion faces the prospect of reduced functioning and quality of life. A study in nursing home residents found a number experienced a decline in major physical functions following influenza-like

illness [Barker, 1998], and in another study a portion of hospitalized cardiopulmonary patients with influenza required a higher level of care at discharge [Falsey et al. 2005].

In the elderly population, hospitalization has been associated with negative outcomes. Notably, NCDs including pulmonary disease, dementia or stroke and cancer have been associated with hospitalization due to influenza or pneumonia, or death, during the influenza season [Hak et al. 2004]. One study found over 70% of elderly people who developed catastrophic disability had been hospitalized during the year. The most frequent discharge diagnoses included stroke, hip fracture, congestive heart failure, pneumonia, coronary heart disease and cancer [Ferrucci et al. 1997]; all of which can be complication of influenza illness. Another study found daily living function had declined in more than a third of elderly patients at discharge from hospital compared with baseline, with greater frequency in older age groups [Covinsky et al. 2003]. Among those hospitalized in the US aged 85 or older, 41% were discharged to long-term care or other facilities [Elixhauser et al. 2000].

Overall, these results point to a potential longer-term impact of influenza. Amongst the elderly, and particularly those with chronic conditions, the effects may extend beyond acute infection, with a reduction in independence and functioning, and resulting in increasing disability and care requirements, with the associated costs.

### ***Influenza immunization may prevent hospitalization in at-risk populations***



*Figure 1: Hospitalization has been associated with negative outcomes in the elderly.*

### **BENEFITS OF INFLUENZA VACCINATION**

Vaccination is regarded as the most effective method to prevent influenza and its associated severe outcomes, and many health authorities worldwide include the vaccine in their national immunization schedules [Miller 2010; WHO 2009]. Vaccination guidelines often focus on specific populations, and surveys indicate nearly all national recommendations target the elderly, and most include those with high-risk conditions [Mereckiene et al. 2010; MIV 2005; Palache 2011; Ropero-Álvarez et al. 2009]. WHO recommendations also target these groups [WHO 2005b].

#### **Benefits of vaccination in patients with non-communicable diseases**

While debate continues regarding the precise level of vaccine effectiveness in adults with NCDs, several studies have found reduced hospitalizations and deaths in those with risk factors for influenza complications. A number of studies have also examined the effect of vaccination on other non-influenza outcomes. Argentinean research in adults hospitalized for myocardial infarction or angioplasty found a substantially lower percentage of cardiovascular deaths in vaccinated patients one year after immunization, compared with those who were unvaccinated. A Polish study found significantly fewer vaccinated coronary artery disease patients suffered a cardiac ischemic event during the nine month follow up than those who were not immunized [CDC 2010].

#### **Benefits of vaccination in the elderly**

While the level of effectiveness of vaccination in the elderly also continues to be debated, WHO suggests immunization can reduce severe illness and complications by up to 60% and deaths by

80% [WHO 2009]. Previously, research has shown vaccination is associated with reduced hospitalizations due to influenza and pneumonia or death, as well as hospitalizations due to specific NCDs, in the influenza season [Hak et al. 2002; Nichol et al. 1994]. During this period, vaccination may reduce the number of hospitalizations and overall mortality among elderly populations not living in institutions [WHO 2005b].

As well exploring the health benefits of vaccination, a number of studies have examined the potential financial effects also. Research in the US among those aged 65 years and above has estimated overall societal cost savings, and cost-effectiveness of \$980 per QALY saved [CDC 2010]. The Commission in Europe considers the 'cost benefit effectiveness' is largely established for the elderly over 65 [Commission of the European Communities 2009].

## **CONCLUSIONS AND IMPLICATIONS FOR POLICY**

Non-communicable diseases (NCDs), particularly heart and lung conditions, diabetes and cancer, present a huge challenge to health systems around the world. NCDs are responsible for the majority of deaths globally, and affect both rich and poor. As a result, the financial cost associated with these conditions is substantial and increasing.

As the threat from NCDs continues to grow, policy makers are increasingly focusing on modifying risk factors to help prevent these chronic diseases. While this preventive action is welcome, it is important that efforts are also made to protect those who develop NCDs, both from the conditions themselves and from the impact of communicable diseases, such as influenza. Notably, several major NCDs are risk factors for influenza-related complications, hospitalizations and deaths, both for younger adults and the elderly. Influenza may also have a longer-term impact in older groups, with some survivors facing reduced functioning and quality of life, and requiring increased levels of care.

Consequently, prevention policies need to encompass more than just NCDs, and consider the impact of other diseases as well. In the case of influenza, vaccination is considered the most effective preventive measure. Although debate is ongoing regarding the precise level of benefit in different groups, studies point to reductions in both hospitalization and deaths, and many countries recommend vaccination for the elderly and patients with chronic conditions, such as cardiovascular, pulmonary, renal and metabolic diseases (such as diabetes).

Influenza can have a devastating impact on the elderly and other patients with high-risk chronic conditions, and it is crucial that policies to address NCDs and infectious diseases come together to help protect these vulnerable groups. Influenza has long been considered a 'vaccine-preventable' disease, and vaccination continues to offer an important opportunity to help achieve this goal.

## SOURCE MATERIAL AND BACKGROUND READING

The intention of this paper is to contribute to ongoing policy debate in the field of NCDs and influenza related policies. Therefore, the paper is presented as a discussion document rather than a scientific publication or formal scientific review of the field. It is informed by a blend of reference and literature sources, personal clinical experience gained during the last two decades and discussions with experts in the field over many years. The following bibliography is included to provide readers with references and background information.

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