PMU15

ECONOMIC IMPACT OF PREVENAR 13 VACCINATION AGAINST PNEUMOCOCCAL PNEUMONIA HOSPITALIZATIONS IN DANES 65+ WITH A CHRONIC DISEASE

- a modelled analysis

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Introduction

1.1 million Danes are older than 65 years of age (19% of population) with half of them being diagnosed with a chronic disease. Patients 65+ with a chronic disease have a 2-7 times higher risk of pneumococcal pneumonia compared to healthy 65+ persons.[1] Pneumonia could worsen the chronic disease of the patient and increase risk of mortality.

Majority of the patients hospitalized in Denmark with pneumonia are 65+ and has a chronic comorbidity (National Patient Registry data). Covering around 30% of all pneumonia cases[2] vaccination against pneumococcal pneumonia is an option with the conjugated Prevenar 13 (PCV13) vaccine as one of them. A vaccine efficacy of 45% in 65+ citizens following PCV13 was documented in a large randomized clinical trial[3], and recently real-world evidence (RWE) revealed a vaccine efficacy of 72.8%.[4-5]

Objective

The aim was to estimate the potential total impact in terms of hospitalizations avoided and costs saved after a vaccination with PCV13 against pneumococcal pneumonia in chronic ill patients 65+ (At risk) in Denmark assuming a 4-year vaccination period from 2017-2020.

Methods

The analysis was modelled and assuming a hypothetical vaccination of all 510,000 Danes 65+ having a chronic disease, i.e. *chronic obstructive pulmonary disease, heart failure and other chronic heart diseases, diabetes, asthma and chronic bronchitis, chronic kidney disease and chronic liver disease*. RW-data on pneumonia hospitalizations came from the Danish National Patient Registry. 30% of all pneumonia cases are pneumococcal.[2] Of these then 41.4% contains the PCV13 serotypes.[6-7]

A RWE vaccine efficacy of 72,8% was used assuming 5-years protection. Eventual re-vaccination was omitted from the analysis as booster vaccination is not recommended by authorities. The analysis was adjusted for the effect of a national child immunization programme (herd immunity) and mortality in the years after vaccination (9.6% annual mortality rate for chronically ill patients).

Table 1 presents the calculation of preventable hospitalizations and cases outside the hospital due to pneumococcal pneumonia.

Table 1: Annual number of pneumococcal pneumonia cases (hospitalized and non-hospitalized) preventable by PCV13 vaccination.

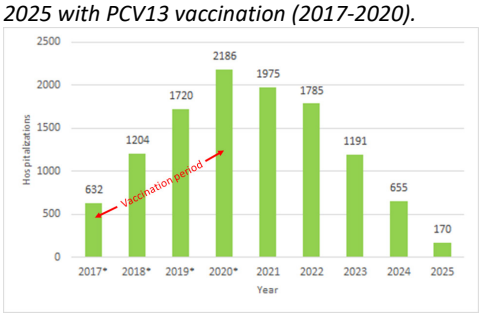
Number of preventable hospitalizations	
Number of chronic ill 65+ patients hospitalized with pneumonia in 2016	*26,483*
+42.6% readmission rate (Danish Statistics)	*37,765*
30% pneumococcal pneumonia share[2]	*11,329*
41.4% containing PCV13 serotypes[6-7]	*4,695*
-26.0% due to herd immunity[8]	*3,474*
72.8% PCV13 vaccine efficacy RW-data[4-5]	*2,529*
Number of preventable cases (besides hospitalized cases)	
Preventable cases assuming 80% of the pneumococcal pneumonia cases occur outside the hospital[9]	*10,116*

Based on a Danish registry study[10] the six months attributable costs of a hospitalized pneumonia patient as compared to a matched control group without pneumonia used in the analysis were €9,200 in terms of regional healthcare costs and €18,000 in total costs. Future costs are discounted with 4%.

Results

Assuming an annual vaccination rate of 25% in the period from 2017 to 2020 the annual number of hospitalizations due to pneumococcal pneumonia that are potentially avoided due to vaccination with PCV13 is shown below in Figure 1.

Figure 1: Annual number of pneumococcal pneumonia hospitalizations avoided from 2017-2025 with PCV13 vaccination (2017-2020).



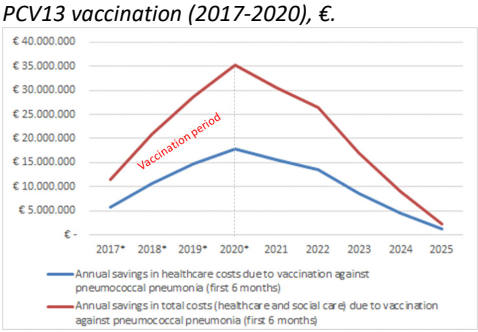
With the increased PCV13 vaccination rate from 2017 to 2020 the number of avoided pneumococcal pneumonia hospitalizations would also increase (Figure 1). In the years after vaccination (2021-2025) the number of patients protected would still be high, although mortality decrease the number.

In total 11,519 hospitalizations due to pneumococcal pneumonia (2017-2025) would potentially be avoided, if all chronic ill 65+ patients were vaccinated with PCV13 vaccine.

Including the assumed 80% pneumococcal pneumonia cases treated in primary care increases the number to 57,595 cases avoided.

Figure 2 show the economic impact in the period 2017-2025 in terms of saved costs on hospitalizations due to PCV13 vaccination.

Figure 2: Annual savings 2017-2025 due to PCV13 vaccination (2017-2020), €.



As with hospitalizations the potentially annually saved health care costs (blue line) and total costs (red line) due to PCV13 vaccination grows in the vaccination period (2017-2020) and decrease in the protection period (2021-2025), though still saving costs.

Cumulative, the potential total costs saved from PCV13 vaccination of the Danish target population with chronic disease can be calculated to 93 million € in regional healthcare costs and 182 million €, incl. both health- and social care costs (total costs).

Conclusion

The analysis shows that hypothetical Prevenar 13 vaccination of all Danes 65+ with a chronic disease (At risk) potentially will prevent 11,595 hospitalizations, and nearly 58,000 cases of pneumococcal disease in total. This will lead to substantial savings in the healthcare sector and society. The costs saved will be higher than the costs of vaccination, although the estimation of these costs were not part of the analysis.

References

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