

# Differences in healthcare costs in citizens aged over 60 years with or without vaccination against pneumococci and influenza

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## INTRODUCTION

- Influenza and pneumococcal vaccination have proven to be cost-effective in numerous studies worldwide. However, studies are mostly health economic models based on short-term effect data for hospital-treated influenza and pneumonia and related short-term costs in selected populations. (Dirmesropian et al. 2015; Porchia et al. 2017; Kuhlmann et al. 2017)
- In our study we adopt a wider perspective on morbidity effects and health care utilization, using of real world claims data of a major health insurance funds (AOK PLUS) in Thuringia.
- Research question: Do vaccinated patients show lower degree of health care utilization, costs and sick leave days than non-vaccinated patients?
- The results for the Thuringian study population will be extrapolated to the German population.

## METHODS

### Study design

- Retrospective case-control-study
- Study population: individuals ≥ 60 years, living in Thuringia, insured with AOK PLUS; cases (intervention group): insured persons vaccinated against pneumococcal (pnc) and/or influenza (flu) infection in 2014; controls (control group) are insured persons without pneumococcal vaccination in 2008-2017 and without influenza vaccination in 2012-2017
- Follow-ups in 2015, 2016, 2017 (and 2018) (see Fig. 1)

### Statistical analysis

- Mean differences and differences in mean changes in outcome measures (see below) between cases and controls
- Adequate adjustment methods (multiple regression analysis, propensity score matching); relevant variables/confounders are: age, gender, nationality, comorbidity (as risk factors for mortality and as risk factors for future costs), earlier severe infections like invasive pneumococcal disease or sepsis, participation in disease management programs for COPD/asthma or coronary heart diseases.

## RESULTS

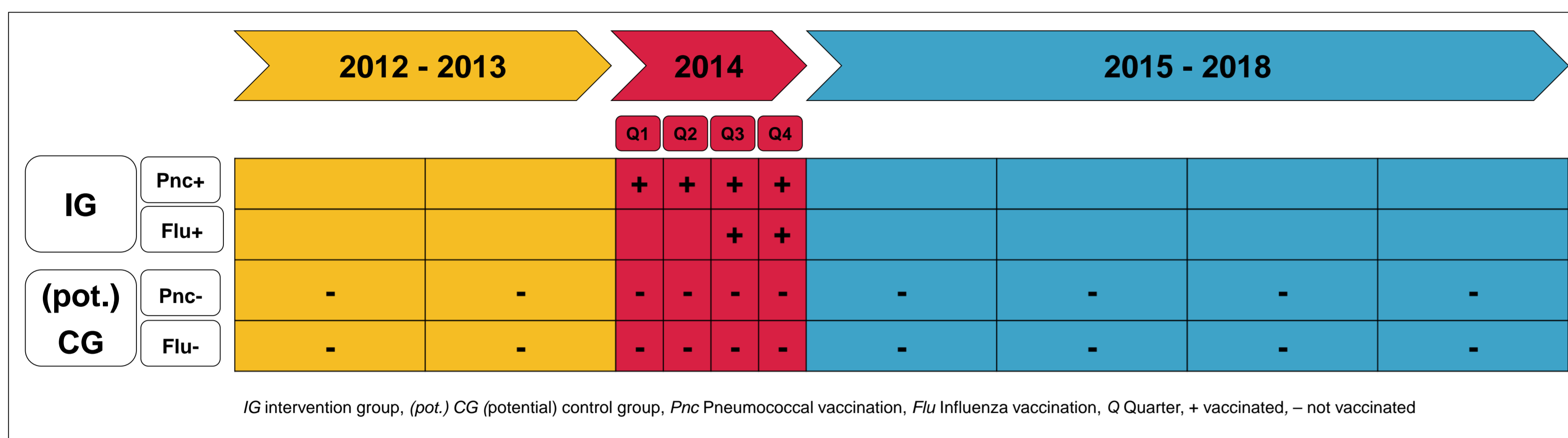


Figure 1: Identification of insured persons of the AOK PLUS

### Identification of cases and controls by vaccination claims

- Codes for pneumococcal vaccination: 89118 A, 89118 B, 89119, 89120, 89120 R, 89964, 89964 A, 89964 E, 89964 B, 89964 I, 89964 K
- Codes for influenza vaccination: 89111, 89112, 89112 N, 89960, 89960 A, 89960 E, 89960 B, 89960 I, 89960 K

### Data sources for the estimation of expected cases (see Fig. 2)

- Number of vaccinated patients ≥ 60 years of age in Thuringia in 2014 reported by the central database of health insurance claims of the Associations of Statutory Health Insurance Physicians (ASHIPs) in Germany (RKI 2017)
- assumption, that at least 40% of the Thuringian population are insured with the AOK PLUS
- 300.000 of the AOK PLUS insured individuals living in Thuringia are older than 60 years

### Outcome measures

- Disease burden:** Influenza, respiratory infections, pneumonia, invasive pneumococcal disease (IPD), sepsis and a combination of influenza, IPD, respiratory infection and superinfections with sepsis
- Health care utilization and cost:** consultations at physicians (general practitioners and specialists), drug prescriptions, hospital care, remedies prescriptions, therapeutic aids, inpatient and outpatient rehabilitation, home care, institutional long-term nursing care, sick leave days

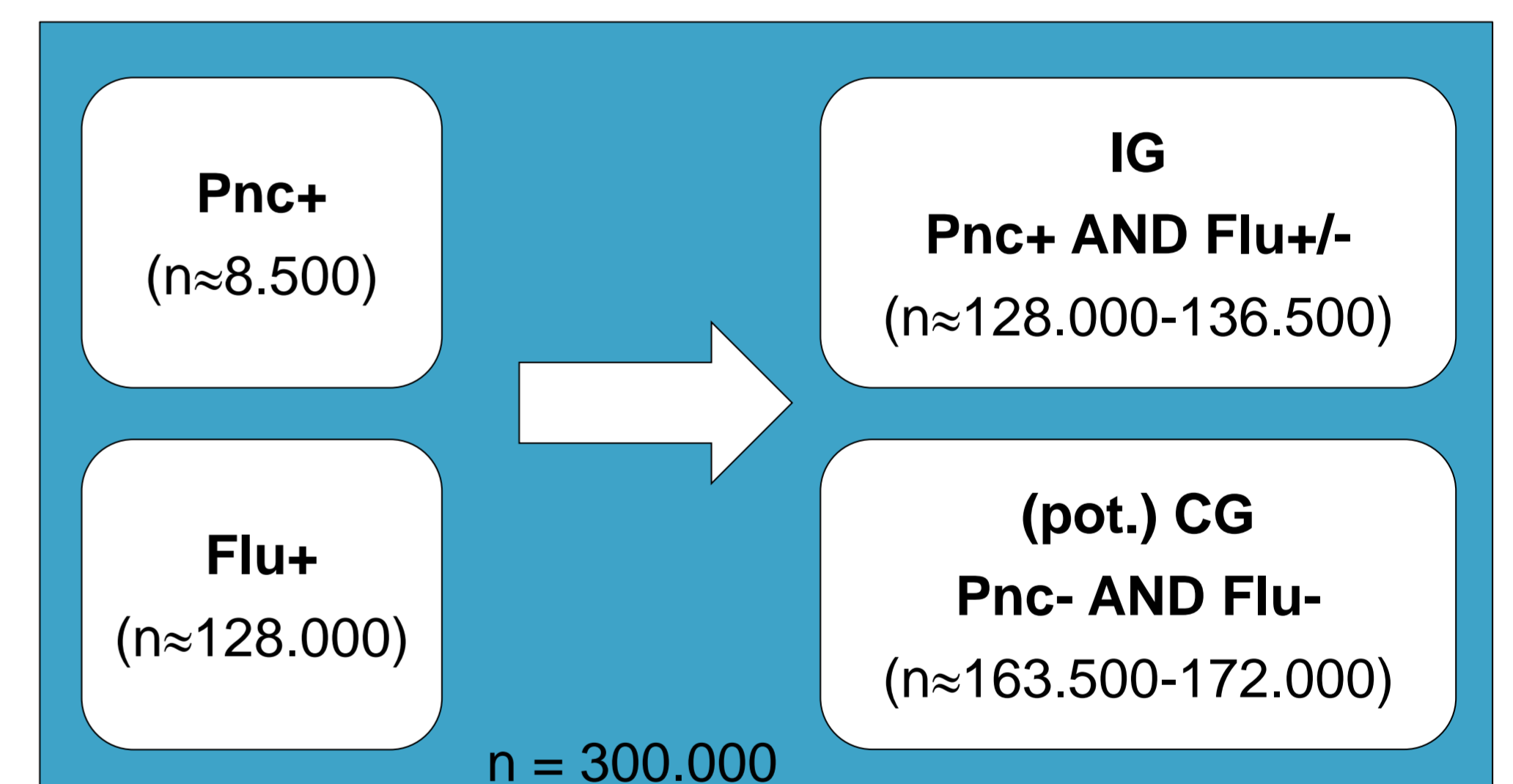


Figure 2: Expected number of cases and controls

## CONCLUSION

- Real-world data on the short- and middle-term effects of vaccinations on health care utilization and costs in the campaign region of Thuringia can serve as a valid data source for local and national stakeholders and will help to derive valuable arguments for their future actions regarding vaccination.
- The study results may also serve as future input parameters for health economic models estimating the cost-effectiveness-evaluation of influenza and pneumococcal vaccinations.

Dirmesropian, S., Wood, J. G., MacIntyre, C. R., & Newall, A. T. (2015). A review of economic evaluations of 13-valent pneumococcal conjugate vaccine (PCV13) in adults and the elderly. *Hum Vaccin Immunother*, 11(4), 818-825.  
 Kuhlmann, A., & von der Schulenburg, J. G. (2017). Modeling the cost-effectiveness of infant vaccination with pneumococcal conjugate vaccines in Germany. *Eur J Health Econ*, 18(3), 273-292.  
 Porchia, B. R., Bonanni, P., Bechini, A., Bonaccorsi, G., & Boccia, S. (2017). Evaluating the costs and benefits of pneumococcal vaccination in adults. *Expert Rev Vaccines*, 16(2), 93-107.  
 Robert Koch-Institut (RKI). (2017). KV-Impfsurveillance: Auswertung von Abrechnungsdaten der Kassenärztlichen Vereinigungen. Retrieved 2017-05-11, from [http://www.rki.de/DE/Content/Infekt/Impfen/Impfstatus/kv-impfsurveillance/kvis\\_node.html](http://www.rki.de/DE/Content/Infekt/Impfen/Impfstatus/kv-impfsurveillance/kvis_node.html)

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