A Budget-Impact Analysis (BIA) of immunizing adults with COPD with the 13-valent vaccine (PCV13) against community-acquired pneumonia and pneumococcal disease

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Objectives
Streptococcus pneumoniae is the leading cause of community-acquired pneumonia (CAP). The incidence of pneumococcal-pneumonia (PP) is greatest at the extremes of age and with comorbidity.

Results
Among risk-groups with COPD GOLD II+ vaccination leads in all age-groups (≥18, ≥50, ≥60, ≥65) to cost-savings over 5-years (from 16.3 million € [218] to 23 million € [250]). Calculations are based on the present pharmacy selling price, which is payed out-of-pocket. Between 1,923-1,075 CAPs and 110-156 IPDs could be avoided over 5-years. Among risk-groups with COPD GOLD III+ reimbursement would increase health-expenditure between 15.2 million € (±18) and 19.1 million € (±250); between 2,747-1,565 CAPs and 131-229 IPDs could be avoided. In GOLDII+ age-groups a PCV13 reimbursement-(break-even)-price between 53-66€ would result in a 0 effect to health-care budgets.

Methods
A multi-cohort, COPD population-based model was developed over a 5-year time-horizon, which includes the following states: hospitalized and outpatient CAPs, inpatient pneumonia, and disease mortality. Patients without immunization are considered for PCV13 vaccination according to the selected vaccination rates. A replication-vaccination is considered. The model includes a serotype shift over time. Results show in which risk-groups savings could be achieved (treatment costs avoided offset PCV13 cost) and within which risk-groups additional health expenditure were generated from the payer’s perspective.

Epidemiological und clinical Data
Epidemiological data were extracted from local sources. The prevalence of COPD and associated GOLD stages were derived from the Austrian BOLD study (Schmholzer et al. 2007). For missing information German BOLD data were used. Local DRG data has recorded 37,125 hospital pneumonia (J12 codes) in 2011. Based on this rate of 4,491,019 Inhabitants were used. In 2015, 422 IPD cases were registered. Based on a 3-year observational period an incidence rate of 4,66/100,000 and 565/100,000 was assessed. The percentage of exacerbations induced by pneumococci amounts 12.5% (Obert et al. 2012); 65% of which with PCV13 serotypes.

Resource Use and Costs
The BIA includes primary costs of hospitalized and outpatient CAPs, hospitalized IPD, COPD exacerbation costs and costs for vaccination including application. Vaccination costs consider the fact of previously immunized people, replication-vaccination and an assumed vaccination rate (60% to 74%) over the 5 year time horizon. The target population receiving vaccination is displayed in Fig. 3.

Sensitivity Analysis
Deterministic sensitivity analysis was carried out. Fig. 5A display results for the GOLD II+ risk population and Fig. 5B for the GOLD III+ risk population.