



Burden and risk factors of ambulatory or hospitalized CAP: A population based cohort study



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ABSTRACT

Background: Data on incidence, risk factors and outcome of community-acquired pneumonia (CAP) including outpatients is sparse.

Methods: We conducted a cohort study on 1.837.080 adults insured by a German statutory health insurance in 2010–2011. CAP was identified via ICD-10-GM codes, ambulatory cases were validated by antibiotic prescription within 7 days. Primary outcomes were incidence, hospitalisation and 30-day all-cause mortality. Evaluated risk factors included age, sex and comorbidities. Evaluation was done by multivariate regression analysis adjusting for these factors and health care utilization.

Results: CAP incidence was 9.7 per 1000 person years, hospitalisation rate 46.5%, and 30-day mortality 12.9%. 30-day mortality of ambulatory cases was 5% (with 27% subsequently hospitalized for another diagnosis before death). 30-day mortality of hospitalized patients was 21.9%, but in-hospital mortality 17.2%. Risk factors for CAP included age, male sex and all evaluated comorbidities with highest risk for neurologic (OR 2.4), lung (OR 2.3) or immunosuppressive (OR 2.1) disease. Mortality risk was highest for neurologic (OR 2.3) and malignant (OR 2.0) disease.

Conclusions: CAP constitutes a major burden in terms of incidence, morbidity and all-cause mortality in hospitalized and ambulatory patients. Interventions to raise awareness for disease impact also in ambulatory patients with risk factors are warranted.

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1. Introduction

Community-acquired pneumonia (CAP) is the major infectious disease of the western world with highly variable disease course and outcome. Published mortality rates vary from <1% to >40% according to treatment setting, disease severity, age and comorbidities [1]. Data on CAP incidence are also highly variable and differ according to country, setting, examined population and study approach [1–13]. Development of CAP also is highly influenced by age and chronic comorbidities [14,15]. However, large population based datasets including evaluation of risk factors and outcome parameters including ambulatory treated CAP patients only rarely have been reported, but are needed to draw firm conclusions on

disease burden and potential preventive measures.

Thus, the aims of the present study were to (1) evaluate incidence, hospitalisation rate and 30-day all-cause mortality in in- and outpatients with CAP and (2) to describe risk factors for all these outcomes in a large population based database covering more than 1.8 million adults from a German statutory health insurance.

2. Methods

2.1. Study sample

We conducted a retrospective cohort study based on data of a large statutory health insurance (AOK PLUS) covering more than 50% of the adult population of the German federal state of Saxony. The demographic characteristics regarding age and sex distribution of the studied AOK-insured adults are in accordance with the reference values from the Federal Statistical Office of Germany [16].

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Estimates regarding socioeconomic status and a valid comparison on all comorbidity rates with the Saxon population cannot be provided. However recent prevalence estimations on chronic skin diseases and mental health based on the AOK Database showed good consensus with population-based estimations [17,18]. Therefore we believe that sufficient representativeness of the study population regarding the source population is given. The study sample included all adults (≥ 18 years) insured through all the study timeline or until death ($n = 1\,837\,080$, Fig. 1). Available data include anonymized data on demographics, diagnoses including comorbidities, drug prescriptions, hospitalizations and outcomes. This study adheres to the principles of Good Epidemiological Practice and Good Practice in Secondary Data Analysis [19] and was

approved by the Ethics Committee of the Technical University Dresden (EK 306082014).

2.2. Case definition and incidence and mortality calculation

Data on CAP epidemiology were retrieved for the years 2010–2011. CAP was identified via ICD-10-GM codes (International Classification of Diseases, 10th Revision, German Modification). The case definition for hospitalized CAP was hospitalisation and either one of the main discharge diagnoses of pneumonia (ICD-10-GM codes A48.1, B01.2, J10.0, J11.0, J12.x–J16.x, J18.x, J69.0 or J85.1) or a main discharge diagnosis of sepsis (ICD-10-GM codes A40.x–A41.x) together with a secondary diagnosis of pneumonia defined

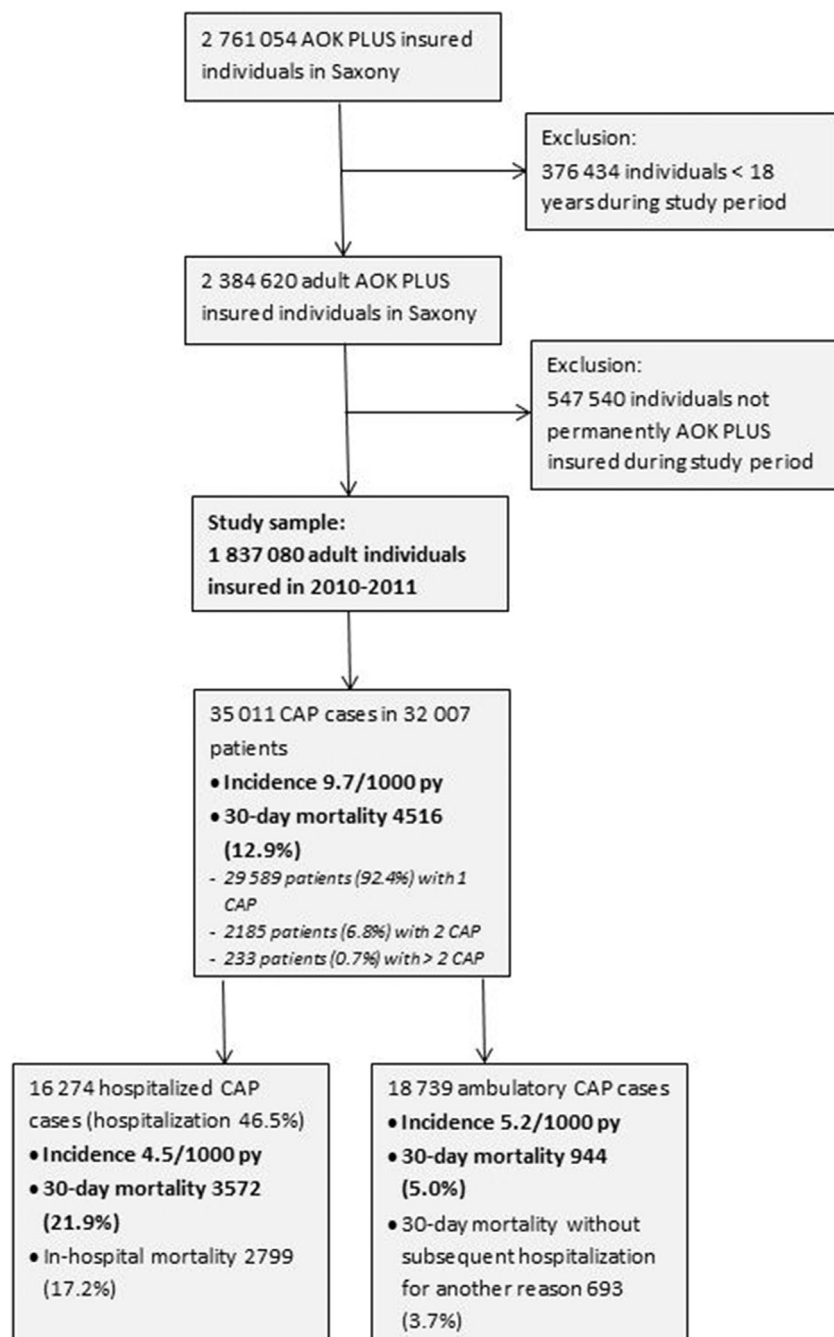


Fig. 1. Flowchart of study sample with incidence and mortality of CAP.

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