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Determinants of hospitalization and length of stay among people with dementia – An analysis of statutory health insurance claims data

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ABSTRACT

Objective: Dementia is a crucial challenge in acute care hospitals. Using a retrospective claims data cohort, this paper explores dementia patients' acute hospitalization rates, risk factors, and length of stay.
Methods: The study used claims data from AOK PLUS, the largest statutory health insurance service (SHI) in Saxony, a federal state of Germany. The analysis included 61,239 people with dementia and 183,477 control subjects, all 65 years and older. Control subjects were age, gender, and regionally matched in a 1:3 ratio. Negative binomial hurdle regression was used to compare differences in hospitalization for the year 2014.
Results: People with dementia had 1.49 times higher adjusted odds of being hospitalized at least once (95% confidence interval [CI], 1.46–1.52). Among those individuals hospitalized at least once, dementia increased the number of readmissions by 18% (95% CI, 1.15–1.20). Dementia patients also had a 1.74 times higher odds for at least one emergency admission compared to individuals without dementia (95% CI, 1.70–1.78). Dementia patients' admission risk factors included having care dependency, being recently diagnosed with dementia and living outside a metropolitan region. The increased length of stay for people with dementia per year was mainly attributable to higher admission rates.
Conclusions: Dementia patients are at higher risk for hospitalization, especially if they live outside the metropolitan region. Healthcare systems need to respond to the challenges resulting from the predicted demographic developments and increasing burden of dementia in the general population.

1. Background

Dementia constitutes an increasing public health burden and is a crucial challenge in acute care hospitals. A German representative study found that 40% of patients in hospitals aged 65 years or above had cognitive impairments (Bickel et al., 2016). Usually, dementia is rarely the main reason for hospital admission; however, the symptoms of dementia can strongly influence patient hospital recovery. The hospital's unfamiliar environment, procedures and the absence of familiar caregivers can exacerbate patient disorientation and behavioural symptoms (Sampson et al., 2014). Delirium, postoperative complications, and falls during hospital stay are associated with dementia (Gross et al., 2012; Rao, Suliman, Vuik, Aylin, & Darzi, 2016). Studies showed that patients with dementia have a higher risk of re-admission and institutionalization (Daiello, Gardner, Epstein-Lubow, Butterfield, & Gravenstein, 2014; Tropea, LoGiudice, Liew, Gorelik, & Brand, 2016; Zekry et al., 2009). Two American studies revealed that dementia was significantly associated with a 41–46% higher risk of hospitalization (Phelan, Borson, Grothaus, Balch, & Larson, 2012; Zhu, Cosentino, Ornstein, Gu, Andrews et al., 2015), and a French study found a higher risk for at least one admission per year of 41% (Tuppin, Kusnik-Joinville, Weill, Ricordeau, & Allemand, 2009). Some hospitalizations indicated suboptimal ambulatory care that could be potentially avoidable (Lin, Fillit, Cohen, & Neumann, 2013). However, further contributing factors for higher hospitalization rates remain unclear. A better understanding of these factors is important to identify high-risk groups and to develop targeted interventions to prevent hospitalizations. Therefore, the objective of the present study was to explore the rates and risk factors for acute hospitalizations on a retrospective large claims data cohort. In addition, studies indicated a longer length of stay

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for people with dementia (Tolppanen et al., 2015; Zhu, Cosentino, Ornstein, Gu, Andrews et al., 2015). However, it is not clear how much of the length of stay is driven by the higher number of hospitalizations and how much is driven by the length of a single hospital episode. Therefore, a second objective of this study was to explore the rate of hospital length of stay for a full year and for a single hospital episode.

2. Methods

2.1. Design and data source

A retrospective claims database analysis was conducted using data of the AOK PLUS, the largest statutory health insurance (SHI) in the German federal state Saxony covering about 53% of the population over 65 years. We obtained pseudonymized claims data from 2008 to 2014, containing information on sociodemographic characteristics and outpatient as well as inpatient health care. We restricted our selection to all individuals of the SHI aged 65 years or older residing in Saxony, with at least one outpatient or inpatient service use in 2014 (n = 526,602). To avoid selection bias, we included individuals that were continuously enrolled and individuals that were not continuously enrolled. Reason for being not continuously enrolled was mainly death (98%); 2% changed the insurance. The year 2014 was the index year for the reported service use. All data provision and analyses were carried out according to German data protection laws.

2.2. Sample selection

The formation of the study cohort is illustrated in Fig. 1. To identify patients with dementia, we constructed dementia quarters based on inpatient and outpatient diagnoses. If one of the following ICD-10 codes were documented, the corresponding quarter was defined as a dementia quarter: G30, G31.0, G31.82, G23.1, F00, F01, F02, F03, and F05.1. Individuals continuously enrolled in the SHI in the year 2014 were included as dementia cases if they had at least three dementia quarters in 2014 (n = 52,275). For individuals that were not continuously enrolled, the diagnosis of the year 2013 was additionally used. If they had at least three dementia quarters in 2013 and 2014, and at least one of them in the year 2014, they were included as dementia cases (n = 9425). By this procedure, 61,700 dementia cases were identified. Individuals without any dementia quarters in 2014 were allocated as individuals without dementia (n = 443,360).

Individuals with dementia were more frequently not continuously enrolled in the year 2014 than the individuals without dementia (15% vs. 3%). This difference is attributed to the fact that the individuals with dementia were older and the risks for dementia and mortality increase with increasing age (Doblhammer, Fink, Fritze, & Günster, 2013). To generate comparable study groups, control subjects were matched separately for continuously and not continuously enrolled individuals, as illustrated in Fig. 1. For both groups, we matched in a 3:1 ratio performing a case-control matching with replacement. Matching criteria were gender, age, and region of residence, represented by the 13 counties of Saxony. The allocation to the counties was based on the zip code, which was extracted from claims data. Overall, the control group contained 183,432 individuals.

We trimmed the upper 1% of inpatient users regarding the number of admissions (6 or more) and length of stay (85 or more days) to reduce the influence of the extreme high users of health care (Neubauer, Zeidler, Lange, & Graf von der Schulenburg, 2014). This resulted in an exclusion of 461 cases (0.7%) and 1053 control subjects (0.6%). Thus, 61,239 cases and 183,477 controls remained for analysis. The trimmed individuals were more likely younger (80 vs. 84 years), male (43% vs.

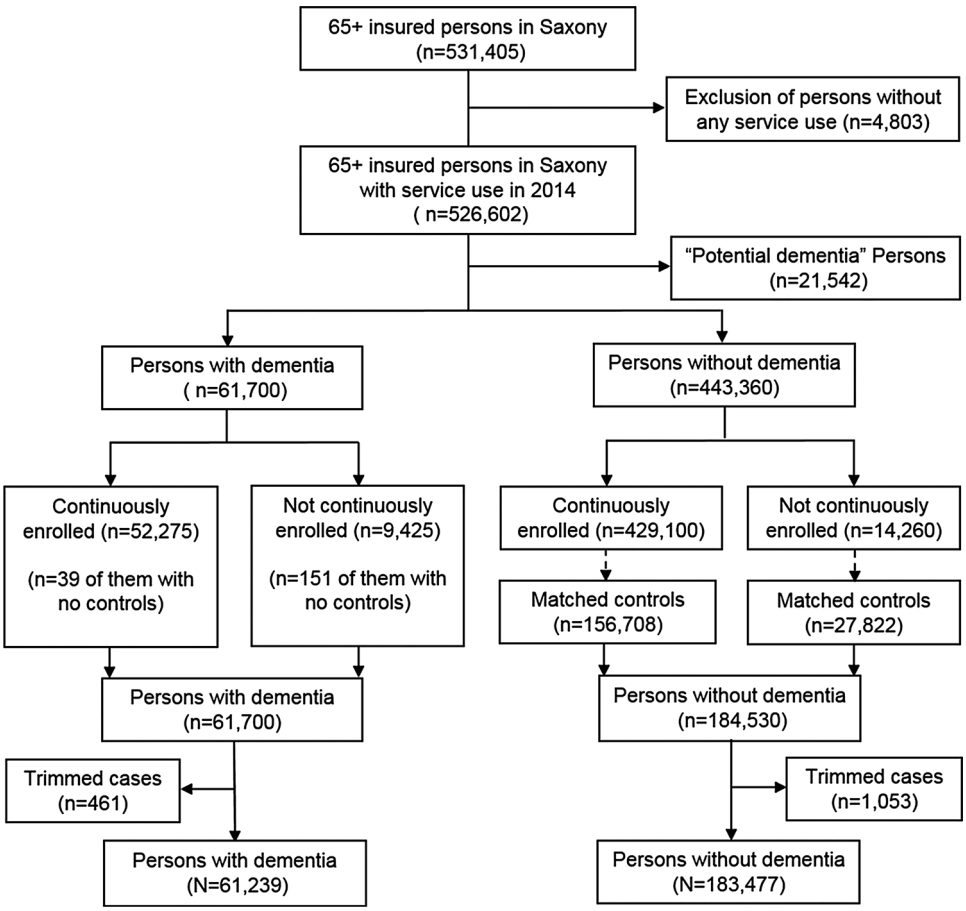

Fig. 1. Study cohort selection (2014).

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