Attention-deficit/hyperactivity disorder (ADHD) among children and adolescents in the ambulatory health care in Germany

Part 3 – Identification of spatiotemporal clusters of administrative prevalence in the period of 2009 to 2016

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Abstract

Background

The attention-deficit/hyperactivity disorder (ADHD) is one of the most frequent neurodevelopmental disorders among children and adolescents. Studies report about increasing prevalence in recent years. However, due to different methodological approaches and various diagnostic criteria applied in the studies it is difficult to estimate real prevalence trends. Previous studies that estimated ADHD prevalence used different methodological approaches which resulted in partly different prevalence estimates. The aims of the current study are to provide up-to-date data on ADHD administrative prevalence for children and adolescents based on available nationwide outpatient claims data and to examine its spatiotemporal development.

Methods

We used nationwide claims data from the years 2009 to 2016. The study population comprised children and adolescents between 5 and 14 years of age. An ADHD case was defined according to the ICD-10 criteria (code F90 "Hyperkinetic disorder"). We considered patients having ADHD, for whom diagnoses were coded in at least two quarters of the corresponding year (M2Q criterion). An administrative prevalence was defined as a ratio of the number of ADHD cases to the total number of insurants, who had at least one outpatient visit in the corresponding year. Local Moran's I was used to examine spatial distribution of ADHD among districts and to classify them into spatial clusters and spatial outliers. The k-means-cluster-analysis for longitudinal data was used to examine the course of the prevalences in 402 districts over the years 2009 to 2016. Finally, we used multilevel logistic regression analysis to examine individual- and district-related factors associated with an ADHD diagnosis. This analysis was stratified by rural/urban residence.

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Results/Conclusion

Approx. 260,000 statutory insured children and adolescents between 5 and 14 years lived in Germany with ADHD in the year 2016. This corresponds to an administrative prevalence of 4.33% (95% confidence intervals [CI]: 4.31−4.34%). The administrative prevalence did not show an increasing trend during 2011 to 2016. Boys were three-times more likely to be diagnosed with ADHD than girls (adjusted odds ratio [aOR]: 3.10; 95% CI: 3.07−3.13). The highest administrative prevalence was observed in both genders in the age group of 10 to 14 years. Children and adolescents living in rural districts with a low population density received ADHD diagnoses more frequently than those living in large urban districts. We observed pronounced small-area differences with prevalence estimates ranging from 1.6% to 9.7%. We identified districts with similar high prevalence estimates (*e.g.* in the north part of Bavaria, the south part of Rhineland-Palatinate, the east of Lower Saxony and Thuringia and the west of Saxony). Districts with spatial clusters of low-low prevalence estimates were found in the south of Hesse and Baden-Wuerttemberg. The k-means-method resulted in six clusters of different size; the biggest cluster contained 117 districts (29%) and the smallest nine districts (2.2%). We observed a stagnating trend in all identified clusters. Children and adolescents living in districts with a higher density of paediatric psychiatrists were 1.22-times more likely to be diagnosed with ADHD diagnosis as compared to those living in districts with a lower density. This effect was most pronounced in urban districts (aOR: 1.40; 95% CI: 1.15−1.71). In addition, children and adolescents living in districts with a lower proportion of individuals without German citizenship were more likely to be diagnosed with ADHD compared to those from districts with a higher proportion (aOR: 1.29; 95% CI: 1.10−1.51). This effect was also most pronounced in urban districts (aOR: 1.55; 95% CI: 1.20−2.00).

We did not observe an increasing trend in the administrative prevalence. Though there were considerable regional differences in the frequency of ADHD diagnoses, there was evidence of declining regional variations. The proportion of individuals without German citizenship and the availability of paediatric psychiatrists were important factors associated with ADHD diagnosis, but they only explained part of the regional variation. Further research with tailored study designs is needed to examine reasons responsible for regional variations.

Keywords

ADHD, attention-deficit/hyperactivity disorder, children and adolescents medicine, cluster analysis, diagnosis prevalence, diagnostics, Germany, multilevel analysis, prevalence, spatial autocorrelation, spatio-temporal cluster, time series

Citation