APPLICATION OF BALANCING TECHNIQUES IN STUDIES UTILIZING GERMAN ADMINISTRATIVE HEALTHCARE DATA

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BACKGROUND

- Large administrative healthcare data sets are increasingly used in observational studies to estimate the effects of health related outcomes for specific diseases, treatments and interventions.[1,2]
- In comparison to randomized controlled trials, where the randomization ensures that treated and untreated patients do not differ systematically from each other, retrospective database studies are prone to selection bias when comparing effects between groups.
- Hence, to adjust for selection bias, researchers often apply matching or weighting techniques.[3]
- The aim of this study was to assess the use of these techniques in studies using German administrative healthcare data.

METHODS

- In May 2017, a systematic literature review via the electronic database PubMed was conducted to assess the application of matching and weighting techniques in studies based on German administrative healthcare data.
- Relevant articles were identified via keywords linking the terms "matching" or "weighting" with various synonyms for administrative healthcare data and Germany.
- Titles and abstracts and where necessary full texts were screened by two independent researchers. The studies were stratified by year of publication, type of used data, category of study objective (eg, burden of disease) and applied methodology (eg, propensity score matching or weighting).

RESULTS

- In total, 363 studies were identified via the applied search algorithm. After screening of titles, abstracts and full-texts, 114 studies were included for the subsequent analyses (**Figure 1**).

Figure 1. Selection process
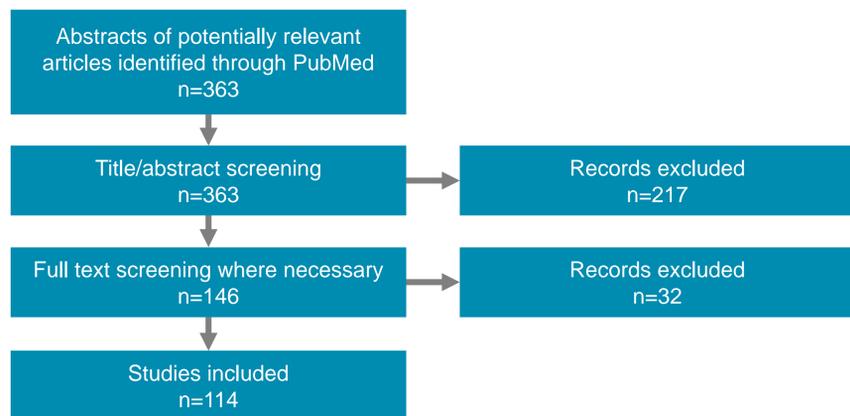
- The growing significance of administrative healthcare data for German healthcare research is evident by the increasing number of studies over the course of time that was also reported elsewhere[2] (**Figure 2**).

### Figure 2. Number of identified publications until 2016
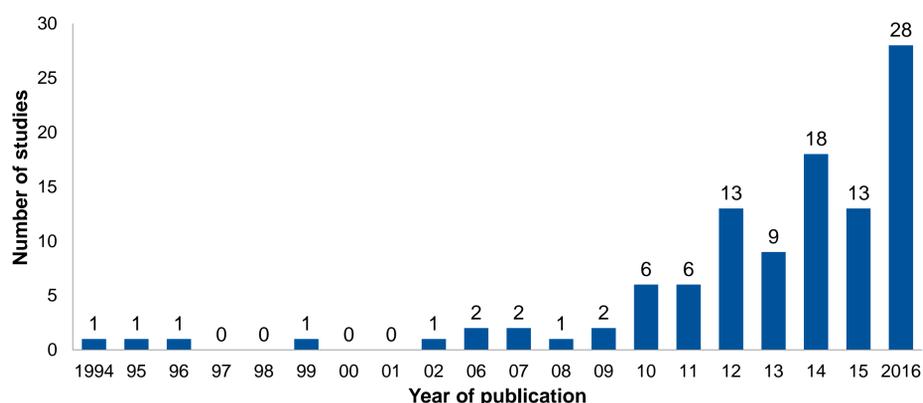
Note: 9 studies were published between January and May 2017 and are not reported in the figure.

- The findings suggest that the use of balancing techniques in studies based on German administrative healthcare data sets gained momentum in 2010 and is still increasing.

- In accordance with the purpose of administrative healthcare data, the most frequent study objectives included cost analyses followed by burden of disease assessments and studies on healthcare resource utilization (**Figure 3**).

### Figure 3. Main objectives of publications
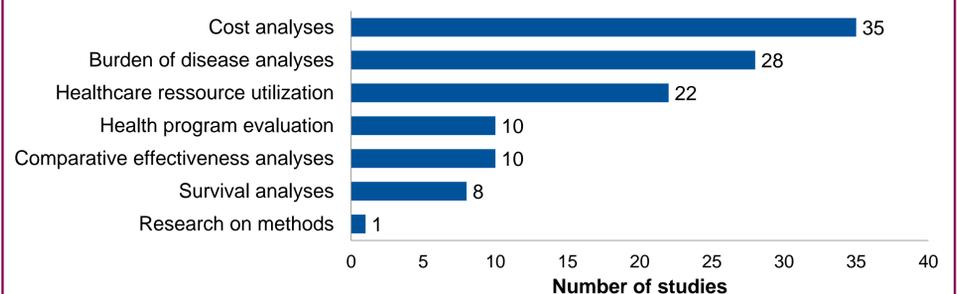
- Direct matching approaches based on variables such as age and gender were used in almost two thirds of the studies (62%), while matching on the propensity score was applied in roughly one third of the analyses (35%) (some studies used more than one approach and hence were counted multiple times) (**Figure 4**).
- Weighting techniques such as inverse probability of treatment weighting or newer approaches such as entropy weighting were rarely incorporated.

Figure 4. Applied balancing techniques
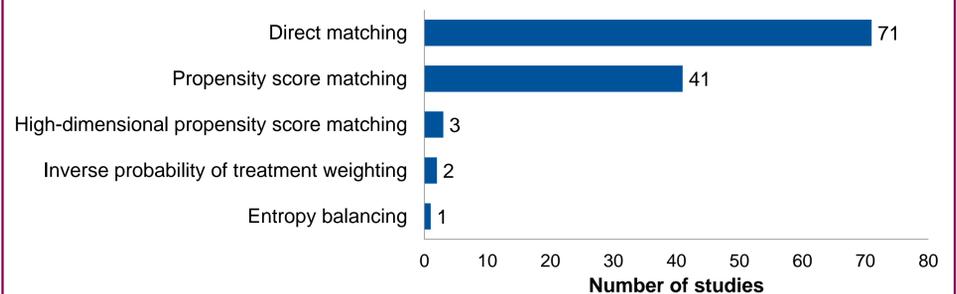
- Claims data from health insurances were the most prominent data source followed by administrative outpatient data (**Figure 5**).

Figure 5. Utilized data sources
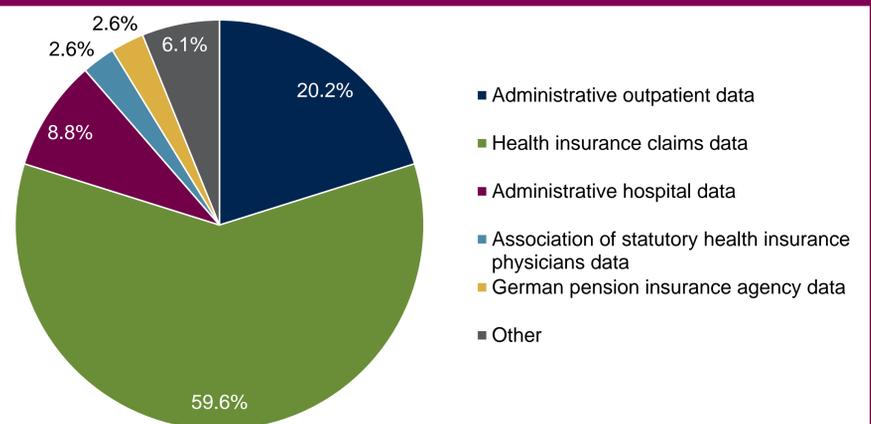
CONCLUSIONS

- The literature review showed that in Germany, observational studies using large administrative healthcare databases and applying balancing techniques to avoid selection bias have only developed during the past couple of years.
- To balance treatment and control groups in German administrative healthcare data, most researchers rely on matching methods, especially direct matching and propensity score matching.
- The use of weighting techniques and relatively new approaches is rare in the German context but should be considered in the future given the strengths of these approaches.

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