

CROSS SECTIONAL CLAIMS DATA ANALYSIS ON MYOPIA

EPIDEMIOLOGY AND TREATMENT OPTIONS IN GERMANY

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Background and Rationale

- Myopia is a refractive error predominantly caused by eye elongation. Current available treatments include prescribed glasses, contact lenses or refractive surgery (Haarman *et al.* 2020).
- The prevalence of myopia is increasing globally. It is estimated that by 2025, half of the world population will be myopic, of which 10% will be highly myopic (≤ -6.00 D) (Holden *et al.*, 2016).
- The visual burden of myopia is expected to increase accordingly. This disease is also associated with severe complications, such as myopic macular degeneration, retinal detachment, cataract, and open angle glaucoma (Flitcroft, 2012).
- Progressive disease and/or severe complication could lead to irreversible visual impairment (Verhoeven *et al.*, 2015).
- Since real-world data on clinical practice in myopia patients in Germany is not well documented, a retrospective real-world study is therefore designed to understand the patient characteristics, outcomes, health care resource utilization (HCRU) and cost.
- This feasibility study has been conducted to understand the capacity and capability of a representative German sickness funds claims database – the WIG2 benchmark database, and to determine whether this claims database is a suitable and reliable resource for the main study objectives.
- The WIG2 database is an anonymized healthcare claims database with longitudinal data from approx. 4.5 million Germans insured by one of various German statutory health insurer (SHIs).

Study Design

A retrospective, cross-sectional, observational study was designed, and patients with myopia (based on ICD-10 GM) with a confirmed diagnosis between 2018 – 2021 were selected from the WIG2 benchmark database (Figure 1). A proxy algorithm was established to stratify sub-populations according to disease severity stage. Results were stratified for children (ages 0–12 years), adolescents (ages 13–17 years) and adults (ages 18 years and older). Specific treatments of myopia and related complications were analyzed to reveal treatment patterns based on prescription data (according to ATC codes).

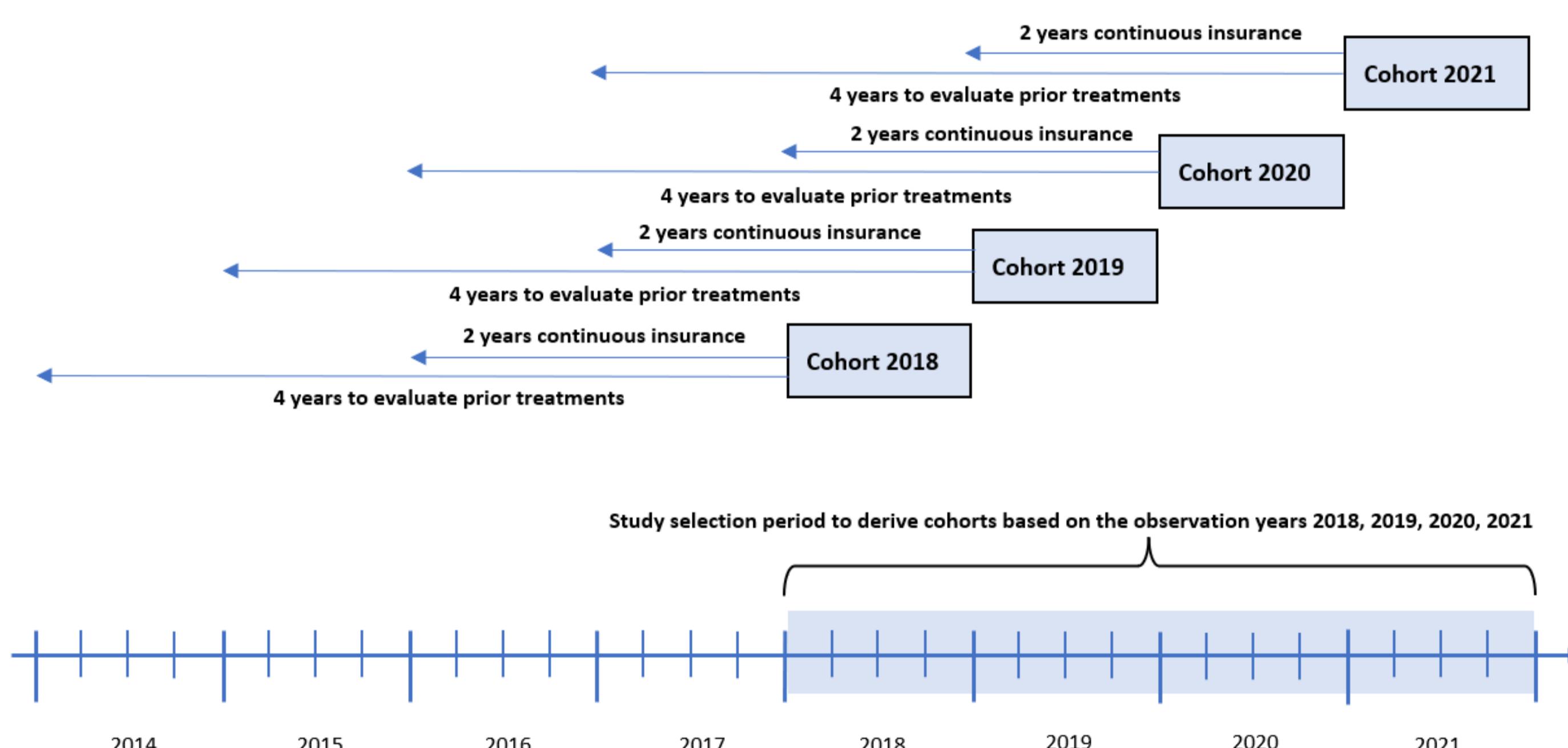


Figure 1. The study design

Key objectives of this feasibility study:

- To understand the distribution of myopia severity stage and assessing the existence of variables allowing for a discrimination between mild/moderate vs. high myopia patients.
- To understand the treatment pattern, burden of disease and HCRU in mild/moderate vs. high myopia.
- To understand the existence of variables that are applied for the reimbursement scheme for pediatric, adolescent and adult patients with regards to lens prescriptions.
- To understand the route and methods regarding the capture of health care management in the database (including treatments, HCRU and the costs of illness).
- To understand the terminology used to describe the severity stage of patients who were diagnosed with myopia.

All results were analyzed and stratified per age group (i.e. pediatric, adolescent and adult).

Acknowledgment

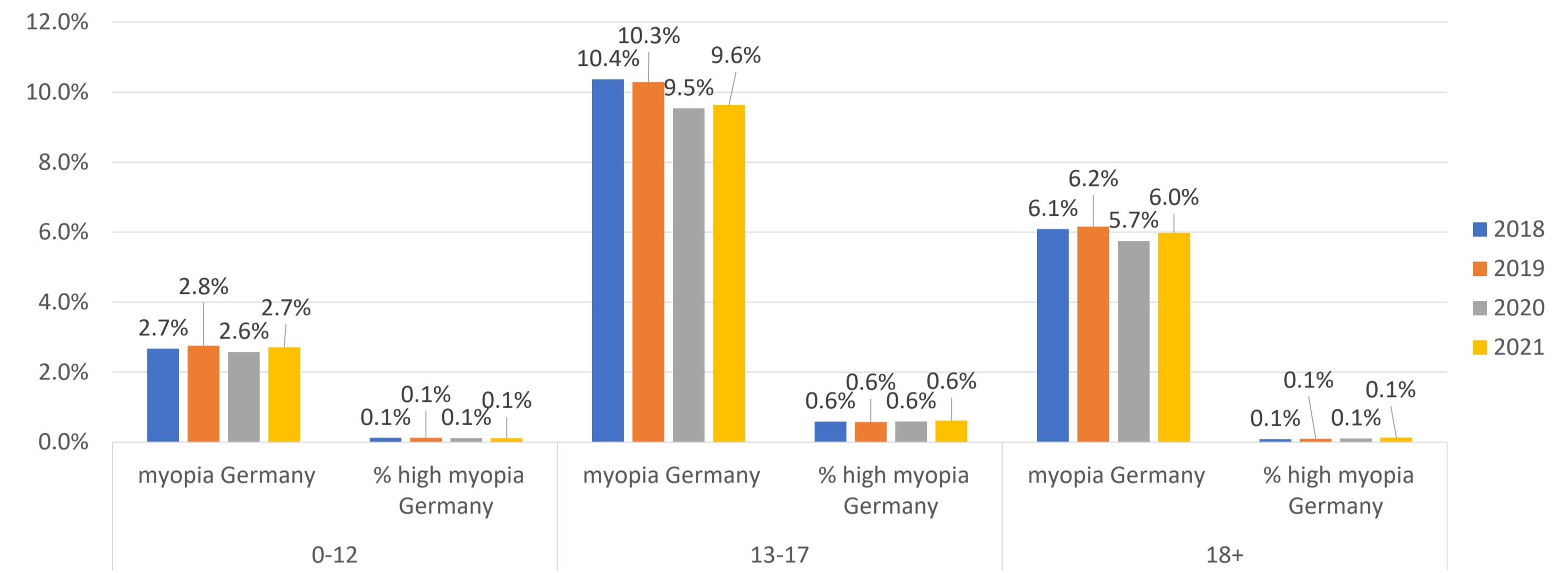
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The WIG2 Institute, which owns the rights to the research database, has conducted the data analysis contracted by ZEG Berlin.

Results

All patients diagnosed with myopia between 2018–2021 were included in the study; prevalence was extrapolated to the German population. Figure 2 shows the epidemiologic data per year between 2018 to 2021. In 2021, the highest prevalence of myopia was observed in the adolescent population (ages 13–17 years) at 9.6%. Prevalence in children (ages 0–12 years) and adults (ages 18+) was 2.7% and 6.0%, respectively. In adolescents with myopia, around 6.3% of patients had prescription lenses that are ≤ -6 D, an indication for high myopia. Results were consistent across the remaining analytical period (2018–2021) with a slightly higher prevalence prior to the COVID-19 period.

Figure 2. Myopia and high myopia prevalence between 2018 to 2021 in Germany per age group.



Furthermore, patients diagnosed with myopia in 2021 were analyzed for the presence of comorbidities (Table 1), and HCRU (Table 2). Secondary diseases of myopia such as retinal detachment or open angle glaucoma were predominantly observed in adult patients (retinal detachment: 2.8% of adults with myopia, open angle glaucoma: 8.3% of adults with myopia).

Table 1. Patients diagnosed with myopia in 2021 and related comorbidities

Myopia	Age group (Years)	Number of patients	Retinal detachment	Glucoma - Open angle glaucoma	Progressive retinal and choroidal atrophy	Vitreous degeneration	Optic nerve alterations	Retinal hemorrhages	Even macular holes	Cataract	Myopic macular degeneration
all myopia	0-12	9,337	0.2%	0.1%	0.0%	0.2%	1.8%	0.0%	0.0%	0.3%	0.4%
all myopia	13-17	13,426	0.2%	0.1%	0.0%	0.5%	2.8%	0.0%	0.0%	0.4%	0.3%
all myopia	18+	148,148	2.8%	8.3%	0.1%	12.0%	9.4%	0.6%	3.7%	20.1%	1.4%
high myopia	0-12	398	0.8%	0.3%	0.3%	0.3%	6.0%	0.0%	0.0%	1.3%	3.8%
high myopia	13-17	844	0.5%	0.2%	0.0%	0.6%	4.6%	0.0%	0.0%	0.4%	2.6%
high myopia	18+	3,088	3.8%	4.6%	0.1%	9.6%	6.9%	0.4%	1.8%	9.2%	5.8%

Almost no hospital stays were only due to myopia (4 stays in total). The average number of outpatient visits due to myopia were higher in patients with high myopia compared to the average number of visits due to myopia in all patients. Outpatient visits due to myopia were mainly visits at ophthalmologists. In the pediatric population, pediatricians were involved in more than 5% of the cases, and in adults GPs were involved in almost 5% of the cases (Table 2).

Table 2. Number of visits connected to diagnosis of Myopia in 2021.

Myopia	Age group (years)	Patients (n)	Ophthalmologist	GP	pediatricians	Anesthetist	Hospital Visits
all myopia	0-12	9337	94.36%	0.87%	6.54%	0.00%	0.16%
all myopia	13-17	13426	96.05%	1.80%	3.88%	0.00%	0.04%
all myopia	18+	148148	96.22%	4.41%	0.04%	0.28%	0.08%
high myopia	0-12	398	88.94%	1.26%	16.83%	0.00%	0.75%
high myopia	13-17	844	96.56%	1.54%	5.21%	0.00%	0.00%
high myopia	18+	3088	96.83%	4.92%	0.13%	0.10%	0.19%

Discussion and Conclusion

The objectives of this feasibility study were well addressed; several limitations should be considered when carrying out the main study:

- The true number on myopia may be underestimated in this database. E.g. patients who directly contacted an optician might not use services provided by SHI; and patients with low myopia may not seek healthcare support.
- While prescriptions for lenses are covered for all insured individuals up to age 18; it only covers the high myopia (≤ -6 D) in adult patients (≥ 18 years old) since 2017 (reimbursement was reintroduced in 2017). Therefore, assumption was made that a number of patients could purchase their glasses without a prescription, leads to an underreported number of high myopia in this analysis.
- No data available on the disease severity of myopia in the current dataset. Severity was estimated based on the diopter of the prescribed lenses. Disease progression was therefore analyzed based on the changes in prescription to new lenses.
- Outpatient visits are not connected to the primary/main diagnosis, hence visits to a physician with diagnosis of myopia might mean either myopia was the primary diagnosis, or myopia was a secondary diagnosis which caused by other diseases.

Despite the limitations, the WIG2 database is considered a suitable resource to support in better understanding the myopia landscape in Germany.