

Age and Gender Specific Comorbidity Profiles in Patients with a Diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD)

Administrative Data from Nordbaden, Germany

Michael Schlender^{1,2}, Oliver Schwarz^{1,3}, Goetz-Erik Trott^{1,4}, Michael Viapiano⁵, Norbert Bonauer⁵

¹Institute for Innovation & Valuation in Health Care (INNOVAL^{HC}), Aschaffenburg and Eschborn (Germany);

²University for Applied Economic Sciences Ludwigshafen; ³University of Cooperative Education Mannheim; ⁴University of Wuerzburg; ⁵KV Baden-Wuerttemberg, Karlsruhe (all in Germany)

Background

The presence of a wide range of coexisting conditions has been recognized as one of the key clinical aspects of ADHD. However, few data are available on patterns of comorbidity by age and gender.

Purpose:

To use the comprehensive medical claims database from Nordbaden, Germany (covering a population of 2.238 million insured patients in 2003), to determine the administrative prevalence of coexisting conditions in ADHD patients by age and gender.

Methods:

11,845 patients with a diagnosis of ADHD (coded as hyperkinetic [conduct] disorder, HK[C]D, F90.0 or F90.1 according to ICD-10) were identified and matched with a non-ADHD control group on a 1:1 ratio based on age and gender. Coexisting conditions were categorized into diagnosis clusters, rates of occurrence of which were compared between groups using Chi-square statistics to explore levels of significance.

Patient Population

Age group	Overall		Male		Female	
	%	n	%	n	%	n
0-6 Years	1.26%	1,893	1.72%	1,331	0.77%	562
7-12 Years	4.97%	7,046	7.16%	5,220	2.65%	1,826
13-19 Years	1.31%	2,306	1.99%	1,791	0.60%	515
20-39 Years	0.06%	384	0.08%	227	0.05%	147
≥40 Years	0.02%	246	0.03%	129	0.02%	117
Total	0.53%	11,875	0.83%	8,698	0.27%	3,177

Database Characteristics

ADHD Group

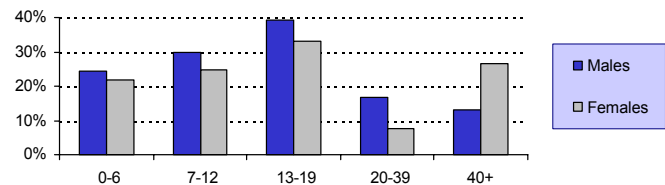
All patients in the region of Nordbaden covered by Statutory Health Insurance (SHI), corresponding to 82.2% of the total regional population of 2.723 million, with at least one diagnosis of HKD (F90.0) and/or HKCD (F90.1) in 2003

Control Group (Matched Pairs Technique)

For each F90.0/F90.1 patient, a control patient with similar demographic characteristics (age, gender, type of statutory health insurance) was randomly identified

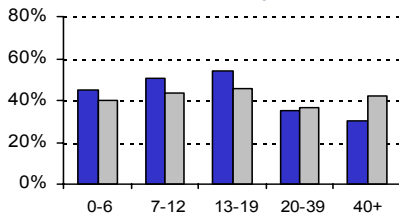
For both patient groups, the complete medical claims data for 2003 were available

Coexisting Conduct Disorder



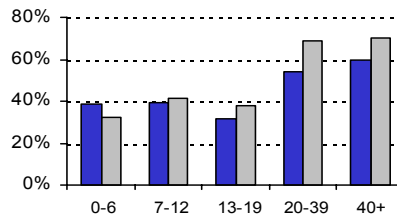
Key Findings

Conduct & Personality Disorders



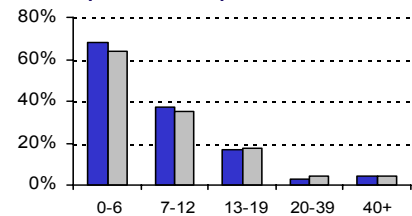
Age group	Overall		Male		Female	
	RR	CI	RR	CI	RR	CI
0-6 Years	9.1	7.4-11.3	7.9	6.3-10.1	12.8	8.3-19.7
7-12 Years	8.2	7.4-9.0	7.5	6.7-8.4	10.1	8.3-12.4
13-19 Years	14.9	12.0-18.5	13.1	10.4-16.6	24.2	13.7-42.6
20-39 Years	45.8	4.7-142.6	37.1	9.2-148.9	63.5	8.9-453.5
≥40 Years	91.22	2.8-649.7	39.6	5.5-284.0	-	-

Mood & Affective Disorders



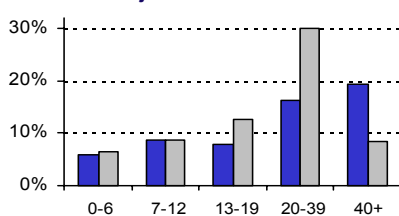
Age group	Overall		Male		Female	
	RR	CI	RR	CI	RR	CI
0-6 Years	4.1	3.5-4.7	4.0	3.3-4.8	4.0	3.0-5.3
7-12 Years	4.2	3.9-4.6	4.0	3.6-4.4	4.9	4.3-5.7
13-19 Years	4.7	4.0-5.5	5.1	4.2-6.2	4.2	3.2-5.5
20-39 Years	4.2	3.2-5.4	6.4	4.0-10.1	3.2	2.4-4.3
≥40 Years	4.6	3.3-6.3	5.6	3.3-9.4	4.1	2.7-6.2

Specific Development Disorders



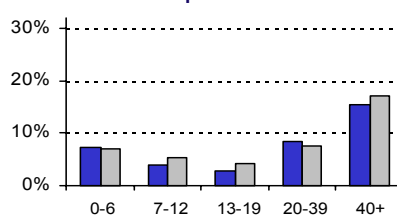
Age group	Overall		Male		Female	
	RR	CI	RR	CI	RR	CI
0-6 Years	2.1	1.9-2.2	2.0	1.8-2.2	2.2	1.9-2.5
7-12 Years	3.1	2.9-3.4	2.8	2.6-3.1	4.0	3.5-4.7
13-19 Years	5.2	4.1-6.6	4.6	3.5-6.0	7.4	4.3-12.6
20-39 Years	14.2	1.9-107.1	6.6	0.8-52.9	-	-
≥40 Years	3.5	1.0-12.4	5.1	0.6-42.9	2.6	0.5-13.3

Adjustment Disorders



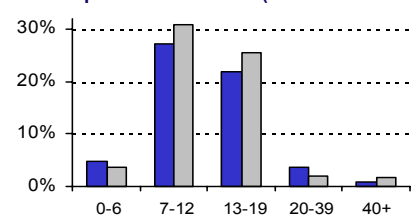
Age group	Overall		Male		Female	
	RR	CI	RR	CI	RR	CI
0-6 Years	5.2	3.3-8.2	4.4	2.6-7.6	7.4	3.1-17.3
7-12 Years	5.0	4.1-6.0	4.7	3.7-5.9	5.8	4.0-8.3
13-19 Years	6.5	4.5-9.4	8.9	5.2-15.1	4.7	2.8-7.9
20-39 Years	5.3	3.2-8.9	11.6	3.6-37.0	4.0	2.3-7.2
≥40 Years	12.1	3.8-38.8	12.7	3.1-52.5	10.5	1.4-80.9

Sleep Disorders



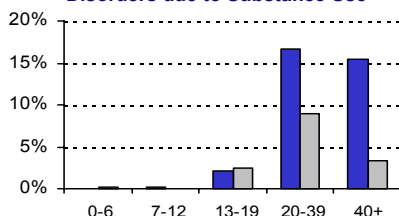
Age group	Overall		Male		Female	
	RR	CI	RR	CI	RR	CI
0-6 Years	2.4	1.8-3.3	3.0	2.0-4.5	1.8	1.1-2.9
7-12 Years	3.6	2.8-4.6	3.2	2.4-4.2	4.9	3.2-7.6
13-19 Years	3.5	2.1-5.7	3.0	1.7-5.3	5.4	2.1-14.2
20-39 Years	4.5	2.0-10.0	3.0	1.2-7.3	13.4	1.8-101.7
≥40 Years	5.2	2.5-10.9	5.1	1.8-14.5	5.3	1.9-14.9

Developmental Disorders (Scholastic Skills)

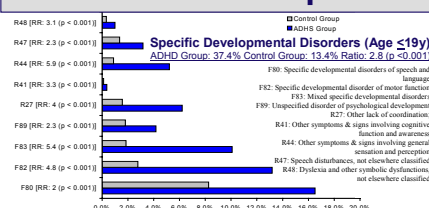


Age group	Overall		Male		Female	
	RR	CI	RR	CI	RR	CI
0-6 Years	6.4	3.6-11.5	5.8	3.0-11.3	8.0	2.4-26.7
7-12 Years	7.9	6.9-8.9	7.1	6.1-8.2	10.1	8.0-12.9
13-19 Years	10.9	8.1-14.5	10.1	7.2-14.1	13.6	7.6-24.2
20-39 Years	11.1	1.4-85.7	-	-	3.3	0.4-31.8
≥40 Years	3.1	0.3-29.7	-	-	-	-

Disorders due to Substance Use



Cluster Example



Implications

Our findings confirm that a broad range of psychiatric disorders may be associated with ADHD, thus underscoring both severity of the condition and clinical relevance of a diagnosis of ADHD. Further research will be required to elucidate the impact on long-term outcomes, on health and social services utilization, and on associated costs.

Limitations:

These findings should be interpreted in the context of the limitations of the study design. In particular, the use of diagnostic codes from claims data will not provide as rigorous information as formal diagnostic assessments would offer.