

HEALTH CARE AND HUMAN SERVICES POLICY, RESEARCH, AND CONSULTING - WITH REAL-WORLD PERSPECTIVE.

IACC Workshop on Under-Recognized Co-Occurring Conditions in ASD

Lessons from Epidemiological and Clinical Experience

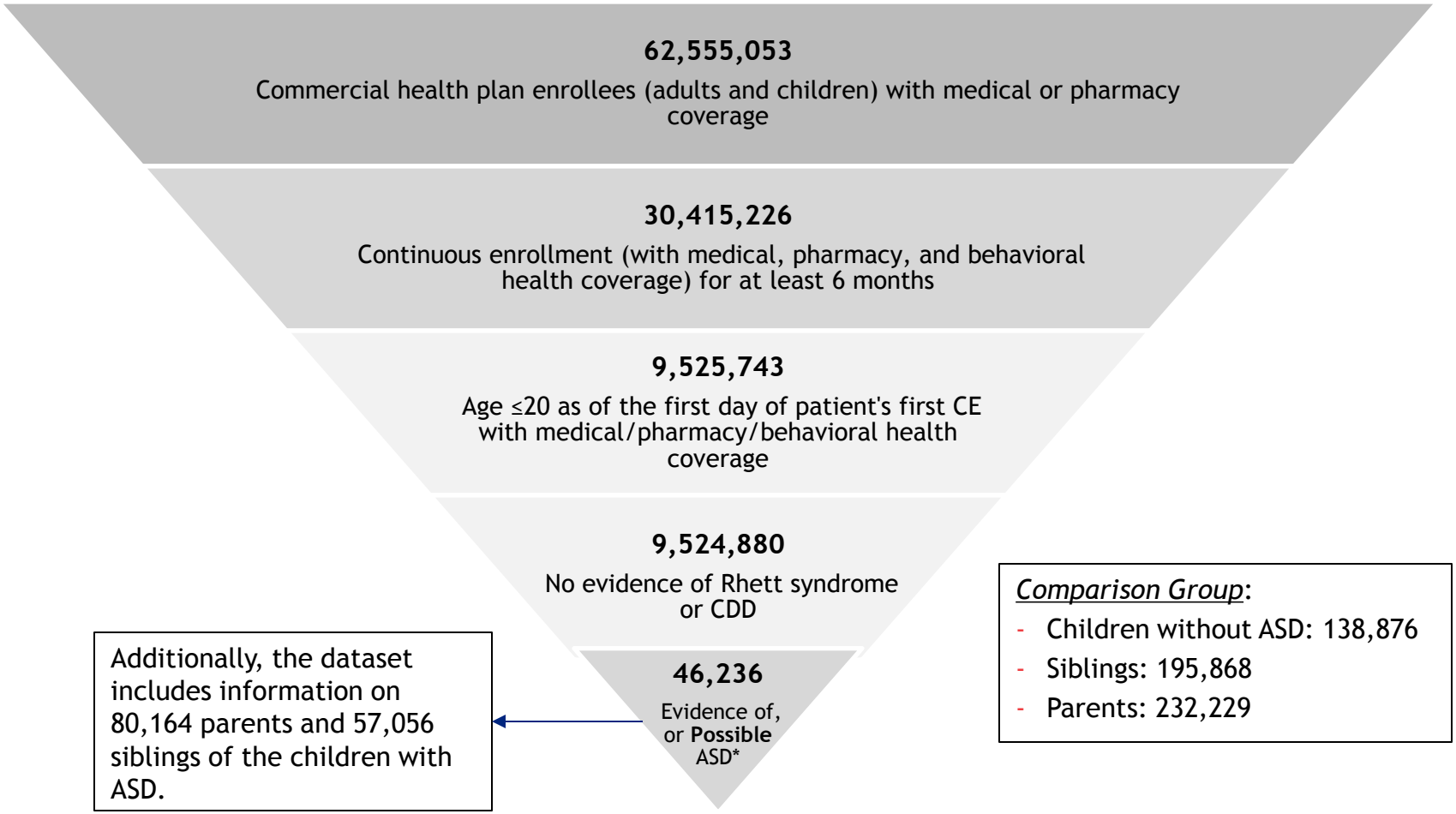
Lewin Health Outcomes Study overview – 4 tasks

- **Task A:** Identify and describe sample
  - Identify children with ASD and their families within the research claims databases and conduct initial descriptive analyses to examine children with and without ASD and their families
  - Conduct a medical chart review to validate the claims-based **ASD case identification algorithms**
- **Task B:** describe and compare the health outcomes of children with ASD and their families to similar families without a child with ASD.
- **Task C:** Describe and compare the use of health services by children with ASD and their families to similar families without a child with ASD.
- **Task D:** Propose an approach for using administrative data to identify potential risk factors for ASD for future research.

Research study overview – baseline data sources

- OptumInsight Research Claims Database: proprietary research database
  - medical and pharmacy claims and linked enrollment information from 1993 to present;
  - geographically diverse across the US, fairly representative of the US population
- Sociodemographic database:
  - person and household level data on socioeconomic characteristics
  - derived through a match between health plan members and a consumer database maintained for a large segment of the US population

Research study overview – sample size



*presence of one or more claims with an ICD-9 for Asperger's, Autism, or PDD-NOS

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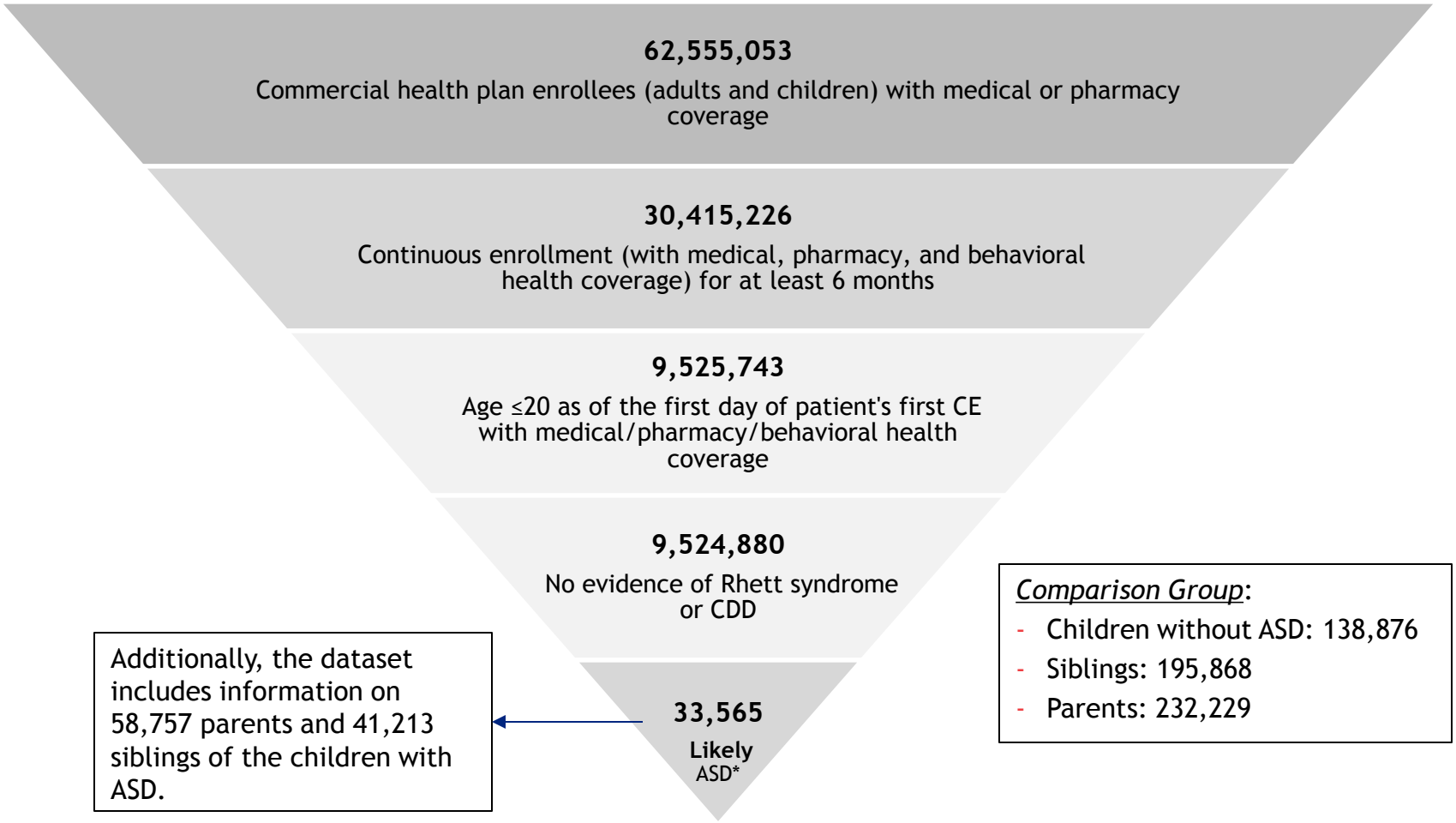

*presence of two or more claims with an ICD-9 for Asperger's, Autism, or PDD-NOS

What have we learned in this research area?

- Evidence that the co-morbidity in every category is more common in persons with ASD.

Comorbidity*	Likely ASD (N=34,754)		Possible ASD (N=11,482)		Total ASD (N=46,236)		Comparison (N=138,876)	
	n	%	n	%	n	%	n	%
Disorders usually diagnosed in infancy, childhood, or adolescence	34,260	98.58	10,957	95.43	45,217	97.80	1,012	0.73
Factors influencing health care	29,680	85.40	9,353	81.46	39,033	84.42	86,890	62.57
Respiratory infections	26,251	75.53	8,161	71.08	34,412	74.43	80,142	57.71
Ear conditions	20,312	58.45	6,297	54.84	26,609	57.55	48,528	34.94
Symptoms; signs; and ill-defined conditions	20,360	58.58	6,029	52.51	26,389	57.07	54,465	39.22
Immunizations and screening for infectious disease [10.]	19,172	55.16	6,065	52.82	25,237	54.58	56,134	40.42
Attention deficit, conduct, and disruptive behavior disorders	17,711	50.96	4,155	36.19	21,866	47.29	7,894	5.68
Eye disorders	16,124	46.39	4,593	40.00	20,717	44.81	35,436	25.52
Developmental disorders	16,220	46.67	4,124	35.92	20,344	44.00	2,493	1.80
Other nervous system disorders [95.]	15,531	44.69	3,864	33.65	19,395	41.95	5,336	3.84
Other upper respiratory disease [134.]	13,920	40.05	3,942	34.33	17,862	38.63	30,306	21.82
Residual codes; unclassified; all E codes [259. and 260.]	13,901	40.00	3,738	32.56	17,639	38.15	27,536	19.83
Viral infection	12,795	36.82	3,790	33.01	16,585	35.87	33,508	24.13
Other lower respiratory disease [133.]	12,568	36.16	3,763	32.77	16,331	35.32	28,842	20.77

* Based on Clinical Classification Software managed by AHRQ. Comorbidities listed are top 10 for Total ASD sample.

What have we learned in this research area?

- Evidence that the mental and behavioral health co-morbidities are more common in persons with ASD.
- Note, these are crude rates and have not been adjusted for other variables.

Comorbidity*	Likely ASD (N=34,754)		Possible ASD (N=11,482)		Total ASD (N=46,236)		Comparison (N=138,876)	
	n	%	n	%	n	%	n	%
Anxiety	6,336	18.23	1,114	9.70	7,450	16.11	3,669	2.64
Attention Deficit (with or without hyperactivity)	12,782	36.78	2,560	22.30	15,342	33.18	5,102	3.67
Bipolar Disorder	3,786	10.89	452	3.94	4,238	9.17	971	0.70
Depression	4,880	14.04	907	7.90	5,787	12.52	5,072	3.65
Epilepsy and other seizure disorders	2,401	6.91	509	4.43	2,910	6.29	470	0.34
Intellectual Disability	1,728	4.97	231	2.01	1,959	4.24	56	0.04
Obsessive-Compulsive Disorder	1,829	5.26	208	1.81	2,037	4.41	267	0.19
Schizophrenia	313	0.90	27	0.24	340	0.74	37	0.03
Tourette Syndrome	492	1.42	63	0.55	555	1.20	66	0.05
Any of the above	19,168	55.15	3,884	33.83	23,052	49.86	10,974	7.90

What have we learned in this research area?

- To capture and control for comorbidity for the child samples in our study, we calculated a comorbidity score (ranging from 0-9) based on the presence (or absence) of diagnosis codes on medical claims (children with and without ASD and siblings).

- Modeled on a similar measure created by Feudtner, et al. (2000).

- For each subject, a dichotomous flag (0/1) was created for each of 9 categories of chronic conditions: 1) neuromuscular, 2) cardiovascular, 3) respiratory, 4) renal, 5) gastrointestinal, 6) hematologic or immunologic, 7) metabolic, 8) other congenital or genetic defect, and 9) malignant neoplasms.

What have we learned in this research area?

- Evidence that the co-morbidity is more common, with higher relative risk, in persons with ASD.
  - Our research found that children with ASD had higher *unadjusted* rates of: infectious diseases, neurodevelopmental disorders, mental health conditions, metabolic dysfunction, autoimmune conditions, congenital/genetic disorders, gastrointestinal conditions.

Health condition	Proportion with Condition*		Odds Ratio	
	ASD (N=33,565)	Comparison (N=138,876)	ASD vs Comparison	
	%	%	Odds Ratio	p-value
Infectious diseases	50.0	34.8	1.88	<0.001
Neurological/neurodevelopmental disorders	70.8	9.2	24.07	<0.001
Mental health conditions	70.1	8.7	24.68	<0.001
Metabolic dysfunction	4.7	1.1	4.38	<0.001
Autoimmune disorders	6.6	3.9	1.75	<0.001
Congenital/genetic disorders	5.1	1.5	3.52	<0.001
Gastrointestinal/nutritional disorders	19.5	5.1	4.44	<0.001
	Rate	**Rate**	**Rate Ratio**	**Upper 95% CI**
Comorbidity Score	0.191	0.082	2.340	2.294
Note: Proportions adjusted for enrollment time.				

What have we learned in this research area?

- Evidence that the co-morbidity is more common in siblings of persons with ASD.
  - Siblings of children with ASD also had higher proportions of all these co-morbidities relative to siblings of children without ASD.

	Proportion with Condition*		Odds Ratio	
	ASD Siblings (N=41,213)	Comparison Siblings (N=195,868)	ASD vs Comparison	
Health condition	%	%	Odds Ratio	p-value
Infectious diseases	41.60	31.50	1.550	<0.001
Neurological/neurodevelopmental disorders	17.30	9.00	2.104	<0.001
Mental health conditions	17.90	8.60	2.321	<0.001
Metabolic dysfunction	1.30	1.10	1.231	<0.001
Autoimmune disorders	4.50	3.30	1.365	<0.001
Congenital/genetic disorders	2.10	1.40	1.515	<0.001
Gastrointestinal/nutritional disorders	7.40	4.20	1.797	<0.001
	Rate	Rate	Rate Ratio	Upper 95% CI
Comorbidity Score	0.091	0.075	1.202	1.176
Note: Proportions adjusted for enrollment time.				

What have we learned in this research area?

- Evidence that the injuries are more common in persons with ASD.
  - Among younger children (during the ages of 0-5), children with ASD had *higher* risk of injury after adjustment for co-occurring conditions and sociodemographic variables.
  - Among older children (11+ years of age), children with ASD had a lower risk of injury than the comparison group.

Independent Variables	Age Period				
	0-2 Years	3-5 Years	6-10 Years	11-20 Years	21+ Years
Sample					
Comparison	ref.	ref.	ref.	ref.	ref.
ASD	1.141*	1.282*	1.001	0.634*	0.580*

What have we learned in this research area?

- Evidence that gastrointestinal disorders are more common in persons with ASD.
  - After controlling for enrollment time and other potential confounders, children with ASD had higher odds of a GI condition than children without ASD (OR=3.94, p<0.001).
  - We also found that the odds of a GI condition were higher following, compared to the 12 months before, the child's initial ASD diagnosis (OR = 1.40, p<0.001)

Independent Variables	Gastrointestinal/Nutritional Conditions			
	Odds ratio	Lower 95% CI	Upper 95% CI	p-value
Sample				
Comparison	ref.	-	-	-
ASD	3.939	3.788	4.096	<0.001

Surveillance Bias

- A significant limitation is the extent of surveillance bias affecting our results. That is, children with ASD receive more care in general than children without ASD, thereby increasing the chance of receiving diagnoses for other conditions in general.

- Our attempts to control for bias using preventive office visits as a marker of health care users suggested this did not usually alter results for chronic or severe conditions

- Nonetheless, surveillance bias continues to be a challenge for more common conditions where care is more optional (otitis, upper respiratory infections, etc.)

Appendix Slides

Demographics

Characteristic	Total ASD (N=46,236)		Comparison (N=138,876)	
	n	%	n	%
Gender				
Male	37,419	80.93	70,321	50.64
Female	8,817	19.07	68,555	49.36
Geographic Region				
Northeast	7,278	15.74	14,537	10.47
Midwest	15,507	33.54	42,064	30.29
South	17,013	36.80	61,497	44.28
West	6,438	13.92	20,778	14.96
Race/Ethnicity*				
N available	28,084	60.74	71,503	51.49
White	24,002	85.47	56,286	78.72
African American/Black	1,002	3.57	4,883	6.83
Native Hawaiian or other Pacific Islander	5	0.02	44	0.06
American Indian or Alaskan Native	85	0.30	203	0.28
Asian	666	2.37	1,899	2.66
Hispanic	1,945	6.93	7,434	10.40
Other	379	1.35	754	1.05
	mean	SD	mean	SD
Continuous Enrollment (months)	37.31	26.42	27.48	21.84

Demographics, cont.

Characteristic	Total ASD (N=46,236)		Comparison (N=138,876)	
	n	%	n	%
Household Income*				
N available	26,457	57.22	63,092	45.43
<$15,000	146	0.55	553	0.88
$15,000 – $19,999	156	0.59	542	0.86
$20,000 - $29,999	405	1.53	1,720	2.73
$30,000 - $39,999	1,238	4.68	4,599	7.29
$40,000 - $49,999	2,437	9.21	7,779	12.33
$50,000 - $59,999	2,840	10.73	7,783	12.34
$60,000 - $74,999	4,199	15.87	10,443	16.55
$75,000 - $99,999	6,458	24.41	13,789	21.86
$100,000 - $124,999	4,800	18.14	9,030	14.31
$125,000 - $149,999	2,370	8.96	4,283	6.79
$150,000 – $249,999	1,039	3.93	1,952	3.09
$250,000 +	369	1.39	619	0.98
Age Group at Index Date				
0-1 years	5,965	12.90	20,864	15.02
2-10 years	27,592	59.68	56,435	40.64
11-17 years	11,161	24.14	43,840	31.57
18-20 years	1,518	3.28	17,737	12.77

New areas to explore

- To what degree are there common patterns of co-occurring conditions among children with ASD, their siblings or among subgroups of children with ASD?
  - In particular, our data could be used to understand the natural course of ASD during transition periods from young childhood to adolescence and from adolescence to early adulthood.
  - This could lead to more optimal timing of treatment interventions and highlight opportunities to impact adult well-being and productivity.
- Research to determine the extent to which elevated risk is a common factor within families. For example, is the increased risk for GI conditions in a child with ASD associated with elevated risk for the same GI conditions among his/her siblings?
  - Analyses of family risk patterns could inform research on etiology as well as research about potential interventions.