A Pilot Study Evaluating Over-Referral of Children without Autism to the Autism Interdisciplinary Team

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Background

- Autism spectrum disorder (ASD) is a developmental disability that can cause significant social, communication, and/or behavioral challenges.
- ASD evaluation including Autism Diagnostic Observation Scale, 2nd Edition (ADOS-2) is required for Louisiana insurance coverage of key evidence-based interventions.
- The LSU HDC ASD Interdisciplinary Diagnostic Clinic utilizes the ADOS-2 and DSM-V criteria to confirm diagnosis in children suspected of ASD.
- ADOS access is limited due to a lack of trained providers. Over-referral can result in delays in diagnosis.

Objective

The main objective of this QI project is to evaluate the predictive validity of ASD screening tools used in referrals to the ASDID clinic in comparison to the final medical diagnosis based on the ADOS-2 results and DSM-V ASD criteria in order to decrease false positive referrals and diagnostic delay.

Methods

Data review and abstraction from 32 patient evaluation files from 2016-2018 by the ASDID clinic

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Data entry from the data abstraction into Excel database. Variables included demographics, family history of ASD, gap time from screening to evaluation, co-morbidities, screeners, and interventions before ASDID clinic visit

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Data analysis in SAS using Fisher's Exact Test to evaluate the strength and association of screener results and other variables to the final clinical ASD diagnosis

Results

Figure 1. Final ASD Diagnosis (N=32)

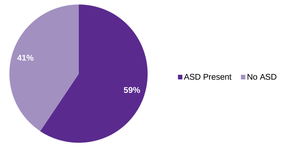

Figure 2. Sex of Children with a Positive Final Diagnosis (n=19)

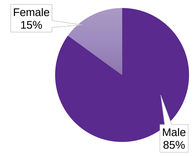

Figure 3. Mean Age at Screening and Diagnosis

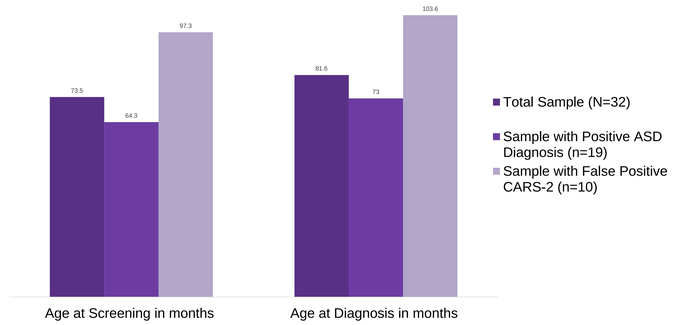

Figure 4. Characteristics of ASDID Patients (N=32):

Variable		Final ASD diagnosis n=19 %(n)	False Positive CARS-2 n=10 %(n)
Sex	Male (25, 78.1%)	64.0 (16)	36.8 (7)
	Female (7, 21.8%)	42.9 (3)	50.0 (3)
Family Household Structure	1 parent (14, 43.8%)	57.1 (8)	33.3 (4)
	2 parents (18, 56.3%)	61.1 (11)	46.2 (6)
Insurance Type	Medicaid (23, 71.9%)	65.2 (15)	31.6 (6)
	Private and Medicaid (2, 6.3%)	0	100.0 (2)
	Private (7, 21.9%)	57.1 (4)	50.0 (2)
Family History of ASD	Negative (26, 81.3%)	50.0 (13)*	52.6 (10)*
	Positive (6, 18.8%)	100.0 (6)*	0 *
Family History of Bipolar or Schizophrenia	Negative (21, 65.6%)	66.7 (14)	35.3 (6)
	Positive (11, 34.4%)	45.5 (5)	50.0 (4)
Race	White (13, 40.6%)	53.9 (7)	45.5 (5)
	African American (18, 56.3%)	61.1 (11)	35.7 (5)
	Other (1, 3.1%)	100.0 (1)	0
Age at Screening	5 years old and younger (20, 62.5%)	70.0 (14)	23.1 (3)
	Greater than 5 years old (12, 37.5%)	41.7 (5)	58.3 (7)
Age at Diagnosis	5 years old and younger (19, 59.4%)	73.7 (14)*	16.7 (2) **
	Greater than 5 years old (13, 40.6%)	38.5 (5)*	61.5 (8) **
Wait time between screening and evaluation	Less than 12 months (25, 78.1%)	56.0 (14)	47.4 (9)
	12 months and more (7, 21.9%)	71.4 (5)	16.7 (1)
ABA Intervention	No ABA (24, 75.0%)	54.2 (13)	44.4 (8)
	Received ABA (8, 25.0%)	75.0 (6)	28.6 (2)
Speech Therapy	No Speech Therapy (7, 21.9%)	14.3 (1) **	83.3 (5)**
	Received Speech Therapy (25, 78.1%)	72.0 (18) **	26.3 (5)**
Other Intervention	No intervention (9, 28.1%)	33.3 (3)	71.4 (5)*
	Received intervention (23, 71.9%)	69.6 (16)	27.8 (5)*
ADHD/ODD Comorbidities	No ADHD/ODD (17, 53.1%)	82.4 (14) **	8.3 (1) ***
	Has ADHD/ODD (15, 46.9%)	33.3 (5) **	69.2 (9) ***
Severity Level of ASD Symptom	Minimal to Low (13, 40.6%)	23.1 (3) ***	70.0 (7) **
	Moderate to High (19, 59.4%)	84.2 (16)***	20.0 (3)**

Figure 5. Positive Predictive Value of Parent Report and Direct Testing Tools:

Test Results			Positive Predictive Value of Total referred population of children (N=32) % (n)	Positive Predictive Value with Positive CARS-2 Results (n=25) % (n)
Parent Report Tools	SCQ (n=27)	Negative (22.2%, 6)		50.0 (2)
		Positive (77.8%, 21)	57.1 (12)	63.2 (12)
	CARS-2 (n=25)	Negative (13.8%, 4)		
		Positive (86.2%, 25)	60.0 (15)	
	ASRS (n=26)	Negative (11.5%, 3)		
		Positive (88.5%, 23)	69.6 (16)	70.0 (14)
Direct Testing Tools	STAT (n=3)	Negative (0)		
		Positive (100.0%, 3)	100.0 (3)	
	ADOS-2 ***	Negative (37.5%, 12)		22.2 (2)
		Positive (62.5%, 20)	85.0 (17)	81.3 (13)

Note: * for p <0.1; ** for p < 0.05; *** for p < 0.01

Conclusions

- The average age at ASD diagnosis in the ASDID clinic is 73 months (6.08 years), twice the national recommended age of 3 years.[1]
- Similar to the national ratio,[2] for every girl who receives an ASD diagnosis, five boys are diagnosed with ASD in the ASDID clinic.
- All parent report tools had high false positive rates compared to the ADOS-2, leading to over-referral for the costly ADOS autism evaluation.
- Children with the following characteristics were more likely to have false positive CARS-2 results:
  - no family history of autism,
  - older age at diagnosis,
  - diagnosis of ADHD or ODD
  - no receipt of speech therapy
  - low severity ASD symptoms on the ADOS-2
- The addition of a direct testing tool such as the STAT may decrease false positive CARS-2 results by adding a structured play observation component, and thereby decrease the over-referral of children without ASD for ADOS evaluation.

Limitations:

- Small sample size
- Data from only 3 years; one ASDID Clinic evaluation per month
- CARS-2 and STAT were not conducted together for this sample of patients at the ASDID Clinic

Impact

This pilot study suggests that solely using parent report tools to determine need for further ASD evaluation results in high referrals of children who do not have ASD; thus, incorporating direct testing tools, (e.g. STAT) followed by the CARS, may decrease false positive results and lead to an earlier diagnosis for children with ASD.

Next Steps

Recommended next steps for the ASDID clinic include:

- Increase the number of evaluations administered per month
- Continue to monitor screening test validity with incorporation of the STAT followed by the CARS-2

References

1. Baio J, Wiggins L, Christensen DL, et al. "Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014." Morbidity Mortality Weekly Report Surveillance Summary, 27 April 2018; 67(No. SS-6):1–23. DOI: http://dx.doi.org/10.15585/mmwr.ss6706a1.
2. "Autism Spectrum Disorder (ASD)." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, 3 May 2018, www.cdc.gov/ncbddd/autism/facts.html.

Acknowledgement

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