Prevalence of Autism Spectrum Disorder
Update from the Autism and Developmental Disabilities Monitoring Network
Kelly Kast, MSPH

Overview
• Overview of autism spectrum disorder
• Describe the Autism and Developmental Disabilities Monitoring (ADDM) Network
• Discuss prevalence and characteristics of ASD

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD)
• A developmental disorder defined by challenges with social communication and interaction, and highly focused interests and/or repetitive behaviors
• Previously, comprised three conditions
  ▫ Autistic disorder
  ▫ Asperger disorder
  ▫ Pervasive developmental disorder, not otherwise specified

ASD characteristics
• Measured intelligence
  Severe--------------------------------------Gifted
• Social interaction
  Aloid--------------------------------------Passive---------Active but odd
• Communication
  Nonverbal-----------------------------------Verbal
• Behaviors
  Intense-------------------------------------Mild
• Sensory
  Hyposensitive-----------------------------Hypersensitive
• Motor
  Uncoordinated-----------------------------Coordinated

"[ADDM] data are a wonderful asset to professionals, advocates, and families - from understanding how a condition affects your community to building the case on how to address it."

- Adriane Griffen, Chairperson, Friends of NCBDADD (National Center on Birth Defects and Developmental Disorders and Disabilities).

Slide courtesy of Catherine Rice, PhD
Autism and Developmental Disabilities Monitoring (ADDM) Network

• A group of programs funded by CDC to estimate the number of 8 year old children with ASD living in different areas of the United States.

• Goals:
  • Describe the population of children with ASD.
  • Compare ASD in different areas of the country.
  • Identify changes in ASD over time.
  • Understand the impact of ASD and related conditions.
  • Standard for setting ASD prevalence estimates in the U.S.

ADDM Network methods for ASD case ascertainment

• Multisite, multisource (educational and healthcare settings) records-based surveillance methodology

  Phase 1: Screening and abstraction of records at multiple data sources in community
  Records meeting requirements for abstraction go on to phase 2

  Phase 2: All abstracted evaluations reviewed by trained clinicians to determine ASD case status

Permission to access records

<table>
<thead>
<tr>
<th>Health facilities</th>
<th>Education record</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ASD is a reportable public health condition</td>
<td></td>
</tr>
<tr>
<td>• Children &lt; 10 years of age with confirmed or suspected ASD identified by health facilities in the Denver Metropolitan area are reportable to the Colorado Department of Public Health and Environment.</td>
<td></td>
</tr>
<tr>
<td>• Family Educational Rights and Privacy Act</td>
<td></td>
</tr>
<tr>
<td>• Individual agreements were developed with each participating school district and/or IRB approvals</td>
<td></td>
</tr>
</tbody>
</table>

Prevalence of ASD among 8 year old children in 2010

ADDM Network Sites, 2010

Slide courtesy of Jim Baio, EdD
Colorado ADDM Surveillance Area

- 7-county Denver metropolitan area
  - Adams
  - Arapahoe
  - Boulder
  - Broomfield
  - Denver
  - Douglas
  - Jefferson

ASD prevalence per 1,000 8-year-olds, ADDM Network, 2010

- Overall prevalence – 14.7 per 1,000
- Range – 5.7 (Alabama) to 21.9 (New Jersey)

Colorado ADDM Project, 2010

- Tiita Ghosh, MD, MSPH
- Kelly East, MSPH (Project Coordinator)
- Jean Moncrief, RN (Abstractor)
- Vicki Bondurant (Abstractor)
- Stephanie Comenskis (Abstractor)
- Beverly Meek (Abstractor)

- Cordelia Robinson, PhD, RN
- Judy Reaven, PhD (Expert Reviewer)
- Terry Hall, MA, CCC-SLP (Expert Reviewer)
- Pati LaVesser, PhD, OTR (Expert Reviewer)

ASD prevalence per 1,000 8-year-olds by site, ADDM Network, 2010

2010 prevalence estimates - Timeline of significant events

- 2000 – National Child Health Act creating the CDC’s NCBDDD
- 2001 – CDC reported prevalence of ASD in Brick Township, NJ
- 2003 – CDC reported prevalence of ASD in metropolitan Atlanta, GA
- 2004 – IDEA amendment
- 2005 – CDC launches “Learn the signs. Act early.” campaign
- 2006 – Federal government passed the Combating Autism Act
- 2006 – AAP recommended developmental screening for all children
- 2007 – First ADDM report published in MMWR
- 2008 – Colorado Autism Commission created
- 2009 – Colorado 10-year strategic plan published
- 2010 – Colorado HIMAT

ASD prevalence per 1,000 8-year-olds, Denver metropolitan area, 2008

*DMA = Denver metropolitan area
ASD prevalence per 1,000 8-year-olds, Denver metropolitan area, 2008 and 2010

![](ASD_prevalence_graph.png)

*DMA = Denver metropolitan area

ASD prevalence per 1,000 8-year-olds by race/ethnicity, ADDM Network, 2010

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>ADDM Network</th>
<th>Denver metro area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average rate</td>
<td>Range</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>15.8</td>
<td>(6.2 to 22.7)</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>12.3</td>
<td>(4.6 to 17.9)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10.8</td>
<td>(1.2 to 21.4)</td>
</tr>
</tbody>
</table>

ASD prevalence per 1,000 8-year-olds by sex, ADDM Network, 2010

<table>
<thead>
<tr>
<th>Sex</th>
<th>ADDM network</th>
<th>Denver metro area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>23.7 per 1,000 (1 in 42)</td>
<td>15.3 per 1,000 (1 in 65)</td>
</tr>
<tr>
<td>Females</td>
<td>5.3 per 1,000 (1 in 189)</td>
<td>4.2 per 1,000 (1 in 238)</td>
</tr>
<tr>
<td>Male to female ratio</td>
<td>4.5 : 1</td>
<td>3.6 : 1</td>
</tr>
</tbody>
</table>

Proportion of ASD cases by IQ test scores, ADDM Network, 2010

<table>
<thead>
<tr>
<th>IQ Score</th>
<th>ADDM network</th>
<th>Denver metro area</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ &gt; 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IQ unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IQ ≤ 70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Adaptive behavior, Denver metropolitan area, ADDM Network, 2010

- Age-appropriate behaviors necessary for a person to live independently and function in daily life.

- Information available for 39% of cases (n=150)
  - Of these, 51% (n=77) had adaptive scores ≤ 70
  - Of those with adaptive scores ≤ 70, 36% (n=28) had IQ scores borderline or above.

Associated features, Denver metropolitan area, ADDM Network, 2010

<table>
<thead>
<tr>
<th>Feature</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperactivity, attention deficits</td>
<td>347</td>
<td>90.3%</td>
</tr>
<tr>
<td>Odd responses to sensory stimuli</td>
<td>336</td>
<td>87.5%</td>
</tr>
<tr>
<td>Delayed motor milestones</td>
<td>331</td>
<td>86.2%</td>
</tr>
<tr>
<td>Abnormalities in mood or affect</td>
<td>325</td>
<td>84.0%</td>
</tr>
<tr>
<td>Abnormalities in eating or drinking</td>
<td>266</td>
<td>69.4%</td>
</tr>
<tr>
<td>Argumentative, oppositional, defiant, destructive</td>
<td>258</td>
<td>68.2%</td>
</tr>
<tr>
<td>Aggression</td>
<td>200</td>
<td>52.3%</td>
</tr>
<tr>
<td>Lack of fear or excessive fearfulness</td>
<td>196</td>
<td>51.0%</td>
</tr>
<tr>
<td>Temper tantrums</td>
<td>183</td>
<td>47.7%</td>
</tr>
<tr>
<td>Abnormalities in sleeping</td>
<td>180</td>
<td>46.9%</td>
</tr>
<tr>
<td>Abnormalities in the development of cognitive skills</td>
<td>171</td>
<td>44.5%</td>
</tr>
<tr>
<td>Self-injurious behavior</td>
<td>130</td>
<td>33.6%</td>
</tr>
<tr>
<td>Seizure spells, seizure-like activity</td>
<td>81</td>
<td>21.1%</td>
</tr>
</tbody>
</table>

Percent of ASD cases who received a developmental evaluation by 36 months, ADDM Network, 2010

<table>
<thead>
<tr>
<th></th>
<th>ADDM network</th>
<th>Range</th>
<th>Denver metro area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>44%</td>
<td>33% to 56%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Percent of ASD cases with a diagnosis noted in record and median age of diagnosis, ADDM Network, 2010

<table>
<thead>
<tr>
<th></th>
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<th>Range</th>
<th>Denver metro area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent with ASD diagnosis</td>
<td>80%</td>
<td>65% to 90%</td>
<td>65%</td>
</tr>
<tr>
<td>Median age of ASD diagnosis*</td>
<td>53 mo.</td>
<td>46 mo. to 61 mo.</td>
<td>60 mo.</td>
</tr>
</tbody>
</table>

* Includes only those cases with age of diagnosis noted in the record.

Summary

- More children are identified with ASD.
  - In the Denver metropolitan area, 1 in 101 8-year-old children were identified with ASD in 2010.
  - When you compare this to the same area in 2008, this is a 32% increase.

- The prevalence is not the same among all race/ethnic groups.

- Characteristics of children with ASD vary greatly.

- Most children are evaluated for developmental concerns and diagnosed with ASD after age 3 years.

Resources and contact information

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  CO Department of Public Health and Environment
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  303-692-2680

- www.cdc.gov/mmwr
- www.cdc.gov/ncbddd/autism/addm.html