Early Identification of Autism Spectrum Disorders

Monday, February 25, 2019
Alacia Stainbrook is the Director of Early Learning at the Vanderbilt Kennedy Center's Treatment and Research Institute for Autism Spectrum Disorders (VKC TRIAD). Dr. Stainbrook completed her graduate work in Early Childhood Special Education at Peabody College, Vanderbilt University and has been working with young children with ASD and their families for over 16 years in home, school, and clinic-based settings. As Director of Early Learning at VKC TRIAD, Dr. Stainbrook oversees programs that provide early diagnostic and intervention services for families of young children with ASD as well as professional development opportunities for Early Childhood providers across the state of Tennessee.
Lisa Wiggins is a Behavioral Scientist with the National Center on Birth Defects and Developmental Disabilities at the Centers for Disease Control and Prevention. She is the lead clinician of the Developmental Disabilities Branch and oversees all clinical activities related to autism, including those that explore how many children have autism and factors that put children at risk for autism. She also serves on the board of directors of the Atlanta Autism Consortium. Dr. Wiggins has a Ph.D. in developmental psychology, M.A. in developmental psychology, and M.S. in applied clinical psychology. She has over 15 years of experience with psychological assessment and working with young children with autism and other developmental disabilities. Dr. Wiggins is an author of about 40 publications and has delivered over 100 presentations. She researches and lectures on a variety of topics, including the surveillance, epidemiology, and early detection of autism in young children.
Kristin Sohl is an Associate Professor of Clinical Child Health at the University of Missouri, Thompson Center for Autism and Neurodevelopmental Disorders and Vice Chair of the Child Health Department. She is a pediatrician with extensive experience in medical diagnosis, evaluation and treatment of children with a concern of autism and other neurodevelopmental disorders. Dr. Sohl is regarded as an expert in quality and process improvement for comprehensive autism diagnostic and longitudinal services. She is the site principle investigator for the Autism Intervention Research for Physical Health/Autism Treatment Network (AIRP/ATN) and serves in national leadership roles with each of these programs. She is the founder of ECHO Autism, an innovative framework to increase community capacity to care for children with autism and other developmental/behavioral concerns.
Jeffrey Hine Taylor specializes in behavioral pediatrics and integrated primary care, assessment and treatment of children with ASD and other neurodevelopmental disabilities, and direct application of behavioral-health services and parent/teacher training for children with a wide variety of behavioral-health and developmental needs. His current research and clinical interests include integration of behavioral-health services into pediatric primary care practices, early identification and treatment of autism spectrum disorders within primary care, and use of telemedicine to enhance care and support for children with developmental and behavioral-health concerns and their families.
Early Identification of Children with Developmental Delays: The Public Health Perspective

Lisa D. Wiggins, Ph.D.
National Center on Birth Defects and Developmental Disabilities
Centers for Disease Control and Prevention (CDC)

Association of University Centers on Disabilities
February 25, 2019
Learning Objectives

- Why is it important to identify children with developmental delays and disabilities early?
- How does CDC promote developmental monitoring of all children?
- What are some findings from CDC’s work on screening for autism spectrum disorder (ASD)?
- How does ASD surveillance help us understand early identification of children with ASD?
Did you know?

About **1 in 4** children, ages 0-5 years are at moderate or high risk for developmental, behavioral, or social delay (DD).¹

About **1 in 6** children aged 3-17 has a developmental disability.²

About **1 in 59** children has ASD; however, diagnosis is often not until after age 4 years.³

---

Why is it important to identify children with DD early?

Early identification can lead to early intervention.¹

Early education and intervention can:

- Improve skills and outcomes;
- Increase school readiness; and
- Reduce parent stress and empower families to help their child reach his or her full potential.²,³

What is the difference between developmental surveillance and screening?

**Surveillance/Monitoring**
- Informal process
- Milestone checklists
- Conducted at every well-child visit

**Screening**
- Formal process
- Standardized tools
- Conducted at 9, 18, and 24/30-month well-child visits

Refer to achievement of milestones to guide decision-making
How does CDC promote developmental monitoring of all children?
What is “Learn the Signs. Act Early.”?

Improve early identification of DD so children and their families can get the services and support they need as early as possible.

Materials • Research and Evaluation • “Act Early” Initiatives
How does CDC help families and providers “Learn the Signs.” and “Act Early.”?

Learn the Signs:
- Resources for tracking key developmental milestones and “red flags” that may indicate concern

Act Early:
- Discuss concerns
- Provide positive parenting tips
- Encourage developmental screening
- Refer for evaluation and services
- Find resources for early intervention and family support
What are some “Learn the Signs. Act Early.” materials?
What are some findings from CDC’s work on screening for autism spectrum disorder (ASD)?
<table>
<thead>
<tr>
<th>Age</th>
<th>General Developmental Screening</th>
<th>Autism-Specific Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24/30 months</td>
<td>General Developmental Screenin</td>
<td>&amp;</td>
</tr>
<tr>
<td>3-5 years</td>
<td>General Developmental Screening</td>
<td>&amp; Autism-Specific Screeni</td>
</tr>
</tbody>
</table>

Healthcare providers can also screen a child **any time** a parent has a concern.

The American Academy of Pediatrics recommends the use of **standardized screening tools** for both general developmental and ASD-specific screening.¹

---

Screening for Autism with the SRS and SCQ: Variations across Demographic, Developmental and Behavioral Factors in Preschool Children

Eric J. Moody\(^1\) · Nuri Reyes\(^1\) · Caroline Ledbetter\(^2\) · Lisa Wiggins\(^3\) · Carolyn DiGuiseppi\(^2\) · Amira Alexander\(^4\) · Shardel Jackson\(^4\) · Li-Ching Lee\(^5\) · Susan E. Levy\(^6\) · Steven A. Rosenberg\(^1\)
How does ASD surveillance help us understand early identification of children with ASD?
What is the estimated ASD prevalence from CDC surveillance?

<table>
<thead>
<tr>
<th>Surveillance Year</th>
<th>Birth Year</th>
<th>Number of Sites</th>
<th>Average Prevalence per 1,000 Children (Range)</th>
<th>This is about 1 in X children</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1992</td>
<td>6</td>
<td>6.7 (4.5-9.9)</td>
<td>1 in 150</td>
</tr>
<tr>
<td>2002</td>
<td>1994</td>
<td>14</td>
<td>6.6 (3.3-10.6)</td>
<td>1 in 150</td>
</tr>
<tr>
<td>2004</td>
<td>1996</td>
<td>8</td>
<td>8.0 (4.6-9.8)</td>
<td>1 in 125</td>
</tr>
<tr>
<td>2006</td>
<td>1998</td>
<td>11</td>
<td>9.0 (4.2-12.1)</td>
<td>1 in 110</td>
</tr>
<tr>
<td>2008</td>
<td>2000</td>
<td>14</td>
<td>11.3 (4.8-21.2)</td>
<td>1 in 88</td>
</tr>
<tr>
<td>2010</td>
<td>2002</td>
<td>11</td>
<td>14.7 (5.7-21.9)</td>
<td>1 in 68</td>
</tr>
<tr>
<td>2012</td>
<td>2004</td>
<td>11</td>
<td>14.5 (8.2-24.6)</td>
<td>1 in 69</td>
</tr>
<tr>
<td>2014</td>
<td>2006</td>
<td>11</td>
<td>16.8 (13.1-29.3)</td>
<td>1 in 59</td>
</tr>
</tbody>
</table>
What is the average age of first ASD diagnosis for children born in 2006?

- Although ASD can be reliably diagnosed by 24 months, the average age of first ASD diagnosis is 52 months.¹

- Concerns by age 36 months were documented for 85% of children with ASD, yet only 42% had a comprehensive evaluation by 36 months.¹

---

Where can I learn more?

- The “Learn the Signs. Act Early.” Campaign
  - www.cdc.gov/ActEarly

- The Study to Explore Early Development
  - www.cdc.gov/SEED

- The Autism and Developmental Disabilities Monitoring Network
  - www.cdc.gov/ADDM
For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Lisa Wiggins: lwiggins@cdc.gov
Kristin Sohl, MD, FAAP
Director, ECHO Autism
Vice Chair, Department of Pediatrics
University of Missouri
Increasing Gaps

Rising Prevalence

1 in 500

1 in 150

1 in 59

• Autism awareness
• Referrals
• Parents seeking answers
• Children needing help

• Few treatment options
• Few trained professionals
• Long waitlists at specialty centers...

ECHO Autism
Health Care System Problems


Rising Inequality Declining Health

Moving Knowledge, Not Patients
The ECHO® Model

- **Amplification – Use Technology** to leverage scarce resources
- **Case Based Learning** to master complexity
- **Share Best Practices** to reduce disparity
- **Web-based Database** to Monitor Outcomes
Telemedicine vs. ECHO
ECHO Autism Clinic Framework

Biweekly clinic
Introductions 10 minutes
Case Presentation 35 minutes
Didactic 20 minutes
Wrap Up 10 minutes

GOAL
Increase local access to high quality health care for children with ASD

ECHO Autism Hub Team

Kristin Sohl, MD Director
Kerri Nowell, PhD Clinical Psychologist
Rachel Brown, MD Child & Adolescent Psychiatrist
Sheila Chapman, MS, RDN Registered Dietitian
Alicia Curran, BS Parent Advocate
Melinda Odum, LCSW Resource Expert
ECHO Autism in Missouri

- Unique # of individuals – 440
- Sessions held – 88
- CME Hours – 750
ECHO Autism Pilot Study

• 6-month pilot
  – Twelve 2-hour ECHO Autism clinics
  – 2 clinics per month
  – 14 PCP participants

• Specific focus:
  – Screening & identification of ASD symptoms
  – Managing common medical & psychiatric comorbidities

• Implementation of ECHO Autism was feasible
• PCP participants reported high satisfaction with the program
• PCPs demonstrated improvements in:
  – Self-efficacy in ASD screening and management
  – Adherence to AAP autism screening guidelines
  – Use of ASD-specific resources

• Next steps:
  – Larger sample and direct measures
Our team is now leading a replication study of this model in a multi-site Cluster Randomized Trial involving 10 Autism Speaks Autism Treatment Network Sites in the United States and Canada.

ECHO Autism is funded by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under cooperative agreement UA3 MC11054 – Autism Intervention Research Network on Physical Health.
1. Arkansas Children’s Hospital
2. Nationwide Children’s Hospital
3. Cincinnati Children’s Hospital
4. Holland Bloorview Kids Toronto, Canada
5. Lurie Center/Harvard
6. Children’s Hospital of Philadelphia
7. UC Irvine
8. University of Pittsburgh
9. University of Rochester
10. Vanderbilt University
Methods & Design

Each replication site:
- Recruit 15 primary care providers (total of n=150 PCPs)
  - Patient population >50% underserved
- Conduct 12 ECHO Autism clinics over a 6 month period

Cluster-randomized design with sequential, staggered roll-out
- 5 Cohorts
- 2 Sites & 30 PCPs per cohort
- Sites are randomized
## Design & Timeline

<table>
<thead>
<tr>
<th>Cohort 1: Arkansas CHOP</th>
<th>12/1/16</th>
<th>T1: ECHO Launch</th>
<th>T2: 3 mo Assessment</th>
<th>T3: 6 mo Assessment</th>
<th>T4: Final Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohort 2: Rochester Toronto</th>
<th>12/1/16</th>
<th>T1: ECHO Launch</th>
<th>T2: 3 mo Assessment</th>
<th>T3: 6 mo Assessment</th>
<th>T4: Final Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohort 3: Lurie Center Vanderbilt</th>
<th>12/1/16</th>
<th>T1: ECHO Launch</th>
<th>T2: 3 mo Assessment</th>
<th>T3: 6 mo Assessment</th>
<th>T4: Final Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohort 4: Pittsburgh UC Irvine</th>
<th>12/1/16</th>
<th>T1: ECHO Launch</th>
<th>T2: 3 mo Assessment</th>
<th>T3: 6 mo Assessment</th>
<th>T4: Final Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohort 5: Cincinnati Nationwide</th>
<th>12/1/16</th>
<th>T1: ECHO Launch</th>
<th>T2: 3 mo Assessment</th>
<th>T3: 6 mo Assessment</th>
<th>T4: Final Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/1/17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/1/18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Clinical Replications (sample)

- University of Alabama/Children’s of Alabama
- University of Alaska (Alaskan Native)
- University of New Mexico (Navajo Nation)
- University of Alberta
- Univ. of Kentucky/Univ of Louisville
- Advocate Children’s Hospital
- Children’s Hospital of Los Angeles
- Mayo Clinic
- Seattle Children’s Autism Center
- MIND Institute
- University of North Carolina – Chapel Hill (TEACCH)
- Gertrude's Children’s Hospital – Nairobi, Kenya
- Universidad de Republica – Montevideo, Uruguay
- UMMEED Child Development Center – Mumbai, India
- University of Wyoming
- Behavior Change Institute
ECHO Autism – Moving Forward
ECHO Autism STAT

• Empowers PCPs to diagnose young children (14-48 months) at highest risk for autism

• Training focused on screening, diagnosis (using a multi-tiered risk-stratified approach) & management
  – In-person training on standardized tools
  – 12-month virtual training through ECHO

• Reduces wait time to diagnosis
• Children receive diagnosis without travel
• Expedite early intervention services
Multi-Tiered Autism Diagnostic Process

Universal Screening
- Surveillance (all visits)
  - ASQ: 9, 18, 30 months
  - MCHAT-R: 18, 24 months

Unambiguous Symptoms

PCP Diagnostic Assessment
- STAT
  - Diagnostic Interview
  - Present to ECHO Autism
  - STAT

Referral for Further Evaluation
- Comprehensive autism assessment at a specialty center

Diagnosis & Support

At-Risk

Subtle/Complex

ECHO Autism
ECHO Autism STAT providers

- As of November 2017, all children in Missouri are within 60 miles of an ECHO Autism provider.

- As of May 2018, 26 primary care physicians/practitioners are able to evaluate and diagnosis children under 48 months with obvious symptoms of autism.
ECHO Autism STAT Pilot Study

- **12 Month Pilot Study**, n=19 PCPs
  - In-person training on standardized diagnostic tools
  - 12-month virtual training through ECHO
  - Training on **screening, diagnosis** (using a multi-tiered risk-stratified approach) & **management**

---

**Journal of Autism and Developmental Disorders**

[https://doi.org/10.1007/s10803-018-3696-5](https://doi.org/10.1007/s10803-018-3696-5)

**ECHO Autism STAT: Accelerating Early Access to Autism Diagnosis**

Micah O. Mazurek¹ · Alicia Curran² · Courtney Burnette³ · Kristin Sohl²⁴
Results: Screening Improvement

% Completed Developmental and ASD Screening at 18 and 24 month Well Child Visits over 6 Intervals - Aggregated

- MCHATs 18m %
- Gen Dev Screen 18m %
- MCHATs 24m %
- Gen Dev Screen 24m %

ECHO Autism
Results Screening & Diagnosis

• 16 PCPs achieved reliability on administration of the STAT
• PCPs ↑ self-efficacy in ASD screening and management
• 47 cases were presented for diagnostic consideration
  – n=31 Diagnosed with ASD, n=16 referred for further evaluation
• Families avoided an average of 173 miles of travel
• Diagnostic wait time was eliminated for these families
• Next steps:
  – Independent diagnostic validation (underway)
Are you part of the ECHO?
Share ECHO Autism with others

• Learning happens on:
  – 1st and 3rd Wednesdays 11:45-1:15 CST
  – Virtual, all you need is a forward facing camera
  – No cost (cell phone, tablet, webcam)
  – Sign up at www.showmeecho.com or www.echoautism.org

*Move knowledge, Not Patients*
ECHO Autism
www.echoautism.org

Bringing Best Practice Autism Care to Primary Care
Early Identification of ASD through Telemedicine:
Potential Value for Underserved Populations

Jeffrey Hine, Ph.D., BCBA
Collaborators/Funding:
• Tennessee Department of Education
• Tennessee Early Intervention System
• West Tennessee Health
• Ayer's Children’s Clinic
• VUMC Telemedicine Office
• Hobbs Foundation

Our Directors:
• Zachary Warren, Ph.D.
• Pablo Juarez, M.Ed., BCBA
• Alacia Stainbrook, Ph.D., BCBA-D

Our Team:
• Neill Broderick, Ph.D.
• Mary Fleck, M.Ed., BCBA
• Amy Nicholson, M.S., LPE
• McKenzie Peeler, B.S.
• Amy Weitlauf, Ph.D.
What do we know?
Autism Screening and Evaluation

• Accurate and stable diagnosis is possible during 2\textsuperscript{nd} year of life
• Most children identified with ASD have concerns in medical record before age 3
• Less than half receive an evaluation by age 3
• Age of diagnosis remains after 4 yr of age (52 months)

CDC MMWR Report 2018; Chawarska et al. 2014; Corsello et al. 2013; Dawson et al. 2010; Warren et al. 2011
What do we know?

Autism Screening and Evaluation

• Lack of access to evaluation contributes to substantial family stress and restricts early intervention services

• Challenges amplified for groups from traditionally underserved communities

• Primary diagnostic center for Part C (0-3) EI Services
• Catchment area spans most of the state
• 90% rural, 25% of population
• Mental health professional shortage area
• Travel costs, unpaid leave, and wait times
Reaching Rural, Underserved, and Low-resource Communities

[Map showing locations of Nashville, Memphis, Jackson, Cookeville, Knoxville, Tri-Cities, Clarksville, and Chattanooga.]
Triage

• Families enrolled in State’s Part C (0-3) EI system (West TN)
• Suspicion of ASD
• State EI coordinator completed triage flow-chart
• Family offered choice
<table>
<thead>
<tr>
<th><strong>Triage</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Families enrolled in State’s Part C (0-3) EI system (West TN)</td>
</tr>
<tr>
<td>- Suspicion of ASD</td>
</tr>
<tr>
<td>- State EI coordinator completed triage flow-chart</td>
</tr>
<tr>
<td>- Family offered choice</td>
</tr>
</tbody>
</table>

- Telediagnostic program designed to:
  - Streamline care in an efficient manner
  - Rapidly and accurately identify ASD (or clearly rule out)
  - When clear/pressing issue for family
  - Not for those where more substantial evaluation is needed over time
**Triage**
- Families enrolled in State’s Part C (0-3) EI system (West TN)
- Suspicion of ASD
- State EI coordinator completed triage flow-chart
- Family offered choice

**Streamlined Telediagnostic Evaluation**
- Screening Tool for Autism in Toddlers (Vanderbilt EI)
- DSM-5 Caregiver Interview
- Structured behavior observations
- Feedback and next steps
- Home follow-up
Home Follow-Up

Caregiver training (6-8 weeks)

Local mentorship (6-months)
Caregiver training (6-8 weeks)

Curriculum modules
- Communication
- Social Play
- Challenging Behavior
- Sleep
- Toilet Training

Local mentorship (6-months)
Diagnostic Accuracy

• 20 children (20-34 months of age)
• Referred for evaluation to primary diagnostic center
Diagnostic Accuracy

• 20 children (20-34 months of age)
• Referred for evaluation to primary diagnostic center
• Compared telediagnostic evaluation with blinded gold-standard assessment
Diagnostic Accuracy

- 100% of children identified through telemedicine were confirmed by gold-standard (blinded) in-person assessment
- No children were inaccurately identified
Feasibility

- 45 children (19-32 months, 35 boys, 10 girls)
- Referred over an 11 month period through state EI system
Feasibility

- 45 children (19-32 months, 35 boys, 10 girls)
- Referred over an 11 month period through state EI system
- Families served were on average 145 miles from VUMC
  - Average of 3.92 hours estimated travel time
Remote psychologists provided an ASD diagnosis for 64% of children
Ruled out an ASD diagnosis in 22%
Feasibility Results

- Remote psychologists provided an ASD diagnosis for 64% of children
- Ruled out an ASD diagnosis in 22%
- Psychologists rated ‘certain’ or ‘very certain’ in 87% of cases (n = 39).
Telemedicine provider was engaged: 95%
Able to communicate my concern to the provider: 95%
Provider able to collect important information about my child: 86%
Equipment was not distracting/take away from effectiveness: 85%
Telemedicine made it easier and more convenient: 95%
Results

- 89% increase in total referrals from target region
- 115% increase in referrals for comparison region
Results

• 89% increase in total referrals from target region

• 115% increase in referrals for comparison region

• Target region had 65% decrease in referrals to primary site (Nashville)

• 15% increase in overall show rate
Measuring the service system impact of a novel telediagnostic service program for young children with autism spectrum disorder


Early Identification of ASD Through Telemedicine: Potential Value for Underserved Populations

A. Pablo Juárez1,2,3 · Amy S. Weitlauf1,2 · Amy Nicholson1,2 · Anna Pasternak1,2 · Neill Broderick1,2 · Jeffrey Hine1,2 · J. Alacia Stainbrook1,2 · Zachary Warren1,2,3,4

Embedding Autism Spectrum Disorder Diagnosis Within the Medical Home: Decreasing Wait Times Through Streamlined Assessment

Jeffrey F. Hine1,2 · Catherine G. Herrington1,3 · Alice M. Rothman2 · Rachel L. Mace2 · Barron L. Patterson2 · Kathryn L. Carlson2 · Zachary E. Warren1,2,3

jeffrey.hine@vumc.org
Questions?