Assessment of ASD in Children via Telemedicine

Feasibility, Lessons Learned, and Future Directions

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Overview

- Development of models and tools for tele-assessment
- TELE-ASD-PEDS model overview, feasibility studies
- Lesson learned and future directions of tele-assessment
Training materials:
https://vkc.vumc.org/vkc/triad/tele-asd-peds

Manual:
https://vkc.vumc.org/vkc/triad/manuals/
**Brief history of tele-diagnostic assessment**

- Very few studies systematically evaluated accuracy or clinical value of diagnosing ASD via telemedicine
- Need models that meet families where they are
- Gold-standard approach should emphasize options
- Best-estimate clinical judgement through integration of data

Types of Remote Assessment

- **Store-and-Forward/Asynchronous** (NODA,¹ Cognoa²)
  - Enables sampling across time/contexts
  - Asynchronous
  - Does not allow for adjustment of presses, key behaviors missed
  - High tech demands, limited access to software
  - Pay-per-use requirements

- **Synchronous Virtual Screening** (SORF³, TEDI⁴, ADEC⁵, STAT⁶)
  - Substantial parent coaching and materials
  - Designed to be level 2 screening (in-person) measures

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¹ Smith et al., 2017; ² Abbas et al., 2020; ³ Dow et al., 2020; ⁴ Talbott et al., 2020; ⁵ Nah et al., 2020; ⁶ Corona et al., 2020
Synchronous Virtual Diagnostic Assessment

- **ASD-DIAL**: ASD-Diagnostic Interview and Activities-Lifespan (Miller, 2020; CHOP)
- **A-VABO**: Adapted Virtual Autism Behavior Observation (Kryszak & Albright, 2020; Nationwide Children’s)
- **BOSA**: Brief Observation of Symptoms of Autism (Lord et al., 2020; UCLA)
- **OOPS-HE**: Observation of Play Screener (Nickel, 2020; OHSU)
- **TELE-ASD-PEDS**: (Corona et al., 2020; VUMC)
- General Benefits
  - Clinician and caregiver/child dyad
  - Flexible/available materials
  - Simple technology
  - No assessment specific training required

Tele-diagnostic Service Model

- ASD concerns identified with families enrolled in EI System
- Remote observation of STAT administered by trained clinician
- Designed to streamline diagnosis and provide options for families/providers
We have found:

- It is feasible and valid to use an abbreviated autism evaluation process
- Certainty in 90% of cases, all telemed cases confirmed
- Families highly prefer telemedicine services over traveling
- Increasing volume (more referrals, but less to tertiary center)
- Decreasing wait times
- Save time/financial costs
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What if we cannot have a trained provider on the other side?
“Can Novel Telemedicine Tools Reduce Disparities Related to Early Identification of Autism?”

- Designed for use during a telemedicine-based assessment
- Play-based procedures could be performed by novel users (no training requirements)
- Designed for open and free use
- Uses widely available/cheap materials
- Time-sensitive

(1R21MH118539-01 /ClinicalTrials.gov: NCT03847337)
Parent (or non-specialist) is walked through a set of play tasks that can be modified, repeated as needed.
Approach: Part 1

- Clinical database containing data from >700 toddler ASD evaluations
- Application of machine learning
- UAR 0.84, Sensitivity 0.90, Specificity 0.78 (Corona et al., 2021)
Seven Key Behaviors

1. Socially directed speech/sounds
2. Frequent and flexible eye contact
3. Combines gestures, eye contact, and speech/vocalization
4. Unusual vocalizations
5. Unusual or repetitive play
6. Unusual or repetitive body movements
7. Unusual sensory exploration or reaction
Approach Part 2: Clinical Experts

- Set of administration tasks to best elicit observations
- Created behavioral descriptors and rating system
  - 1 = symptom not present
  - 2 = present but subclinical
  - 3 = clear evidence of ASD
Clinical Trial

Can Novel Telemedicine Tools Reduce Disparities Related to Early Identification of Autism (NIMH 1R21MH118539-01)
Overall diagnostic agreement = 92%

<table>
<thead>
<tr>
<th>Clinical Diagnosis-Telemedicine Diagnosis</th>
<th>TELE-STAT N = 72</th>
<th>TAP N = 72</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD-ASD</td>
<td>64 (89%)</td>
<td>60 (83%)</td>
</tr>
<tr>
<td>No ASD-No ASD</td>
<td>2 (3%)</td>
<td>7 (10%)</td>
</tr>
<tr>
<td>ASD-No ASD</td>
<td>4 (6%)</td>
<td>4 (6%)</td>
</tr>
<tr>
<td>No ASD-ASD</td>
<td>2 (3%)</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>

Can Novel Telemedicine Tools Reduce Disparities Related to Early Identification of Autism (NIMH 1R21MH118539-01)
TELE-ASD-PEDS & COVID-19

- Using TAP in clinical trial, COVID highlighted immense need
- Initial web-based training for >2100 providers
- Individual consultation across 45 sites
Use of the TAP at VUMC: Direct-to-home

- 9 providers
- 204 children (3.5 months early pandemic)
- TAP provided enough information when ASD is clearly present (>70%)
  - High levels of diagnostic certainty
  - TAP scores significantly differentiating those with/without ASD

Appointment Structure

- Pre-visit preparation
- Children 3 and under
  - Visits scheduled for 90 minutes (Zoom)
- Interview, unstructured observations
- TELE-ASD-PEDS (15-20 min)
- Additional measures (VABS-3 Comm/Soc, DAYC-2, CARS-2)
- Feedback/diagnosis/resources
External Providers: Changes in Practice Behavior

- 202 providers completed a survey regarding ASD tele-assessment and the TAP.
- 92% of providers reported using ADOS-2 prior to COVID-19
- 6% using telemedicine for diagnostic services pre-COVID, up to 78% during COVID-19

Use and Perceptions of TAP

- 56% using the TAP during tele-diagnostic evaluations during COVID-19.
  - 98% with children 3 and under, 33% with children 4-6
  - High level of certainty ruling in/out
- 85% of the providers currently using the TAP plan to continue using it post-COVID-19-related disruptions

We have found:

• Providers
  • Comfortable completing assessments
  • Making diagnoses with accuracy and certainty
  • Increased access
• Families
  • Comfortable playing with child
  • Instructions easy to follow
  • Took right amount of time
  • Comfortable discussing diagnosis
  • Provider had seen behaviors of concern
Challenges

- Technology-related problems
- Distractions in home environment, difficulty following prompts
- Complexity
  - Language
  - Medical/social complexity
  - Significant developmental delays
  - Comorbidity
- No single model/score acceptable for ALL families
Key Takeaways

- Findings provide initial support and guidance for a re-conceptualization of ASD assessment
- Large percentage of children can accurately be identified through novel/brief tele-diagnostic measures
- For whom does tele-assessment work best – and for whom does it not work?
TAP Resources/References

- TELE-ASD-PEDS: [https://vkc.vumc.org/vkc/triad/tele-asd-peds](https://vkc.vumc.org/vkc/triad/tele-asd-peds)
- Vanderbilt Kennedy Center’s Treatment and Research Institute for Autism Spectrum Disorders (VKC TRIAD: [https://vkc.vumc.org/vkc/triad/home/](https://vkc.vumc.org/vkc/triad/home/))
References


