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## **MCH Innovations Database** Practice Summary & Implementation Guidance

# TAP TELEHEALTH

The TELE-ASD-PEDS (TAP) Telehealth Evaluation Model is a system designed to increase access to autism diagnostic consultation by allowing clinicians to consult with families and other providers remotely, using an interactive assessment tool designed specifically for these purposes.



		
Location	Topic Area	Setting
Nashville, Tennessee	Access to Health Care/Insurance, Telehealth/Emergency Preparedness	Community
 Population Focus	 NPM	 Date Added
CYSHCN	NPM 6: Developmental Screening	January 2022
Contact Information		

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# Section 1: Practice Summary

## PRACTICE DESCRIPTION

Growing evidence supports telemedicine-based approaches to autism spectrum disorder (ASD) screening and assessment for young children, such as activities to assess infant-toddler social communication skills and remote coaching of parents to complete assessment activities. Through a computationally informed, stakeholder driven design process, we created a new ASD tele-assessment tool for toddlers (the TELE-ASD-PEDS or TAP) to be used as part of a telehealth evaluation for young children (under 36 months). In initial evaluation, we demonstrated that many children with ASD can be accurately identified using tele-assessment procedures (both in Part C centers and home settings), that participating families report high levels of satisfaction with tele-assessment services, and that deploying such systems in rural settings has the potential to dramatically reduce wait times for identification and service. Moreover, subsequent unanticipated broad dissemination of the TAP model during COVID-19 demonstrated potential widespread value to providers and families. Importantly, this widescale use has allowed our team to evaluate tele-assessment across heterogenous institutions and providers, providing rich stakeholder data to inform aspects of ongoing development and future deployment. Qualitatively, benefits noted by providers included increased access for families, the value of in-home/naturalistic observation, increased caregiver involvement, and flexibility in deploying resources to accomplish evaluation (limited need for clinic space, scheduling flexibility).

By dramatically limiting opportunities for traditional in-person evaluation of ASD, the COVID-19 pandemic has exacerbated historical disparities in diagnostic care related to geography, provider shortages, socioeconomic status, race/ethnicity, and primary language. Diagnostic delays contribute to substantial family stress and restrict access to evidence-based early intervention services. The TAP model could address traditional barriers to care access by enabling prompt identification of many young children with ASD within community settings.

## CORE COMPONENTS & PRACTICE ACTIVITIES

The goal of our program is to improve access to early diagnostic evaluations for ASD through innovative telehealth models. Core components of this program include a tele-diagnostic evaluation model that utilizes the caregiver-mediated TAP and other standard evaluation components including record review, parent interview, informal structured observations, caregiver feedback, and care coordination.

Connecting	Create infrastructure/partnerships for referrals. Establish referral	Provide clear pathways for referrals to tele-diagnostic visits. Establish partnerships with community providers that provide pre-assessment information and resources to



	streams from primary care clinics, Part C providers, or other systems	families, as well as provide brief screening and developmental/social history to assessing clinician.
Tele-assessment	Telemedicine-based screening and evaluation for ASD	Connect psychologists to caregivers and young children through use of video-conferencing technology. Utilize the caregiver-mediated TAP to evaluate for ASD. Additional medical history and parent interview are also completed during the tele-evaluation. At the conclusion of the appointment, families are provided with a diagnostic outcome or, for a small percentage of families, referred for a full diagnostic evaluation.
Connecting	Provide clear next steps protocol for families	Create partnerships to ensure families receive clear next steps, appropriate referrals, and care coordination. This can include resources/intervention through Part C system, medical home, or other service providers.

## HEALTH EQUITY

Delays to diagnostic assessment may have lifespan impacts by limiting access to intervention in ways that disproportionately affect specific racial, ethnic, and linguistic groups. The TAP tele-diagnostic model has increased timely access to care for families, especially within rural and under-resourced communities where specialty care can be difficult to obtain. The use of novel tele-diagnostic technology has alleviated significant geographic, financial, and time barriers associated with tertiary diagnostic referrals. For example, Stainbrook et al., (2019) revealed access to a tele-diagnostic evaluation saved families an average of 4 hours of travel time relative to visiting tertiary ASD clinics. Families whose access to care otherwise would have been limited by prohibitive distance, transportation difficulties, time constraints, and/or comfort level of being in unfamiliar settings have been able to connect with diagnostic services within the comfort of their homes or other familiar spaces.

## EVIDENCE OF EFFECTIVENESS

The TAP model involves many years of prior research by our team, leveraging previous funding and expertise in early screening and diagnosis of ASD. Our team had conducted multiple studies of tele-assessment prior to COVID-19 (Corona et al., 2020; Juarez et al., 2018; Stainbrook et al., 2019), but with onset of the pandemic we rapidly disseminated and evaluated its national use across care systems (Wagner et al., 2020; Wagner et al., 2021).



Initially, we studied a tele-assessment procedure in which a remote psychologist observed real-time administration of a standard level 2 screening tool by a trained paraprofessional (Juarez et al., 2018). Results show high levels of diagnostic accuracy and clinician certainty for the procedure, and caregivers reported high levels of satisfaction with tele-assessment, as well as reduced travel burden. The majority of families participating in this model opted to participate in the telemedicine model as a first selected care strategy. We also investigated referral patterns for diagnostic evaluation over a two-year period in the Part C catchment using this model (Stainbrook et al., 2019) and found a 65% decrease in referrals to the tertiary center and an 89% increase in the total number of children evaluated in the district. The average wait from referral to tele-assessment was 11 weeks. In a similar district that did not implement tele-assessment, wait times for visits remained over a year long, while referrals for tertiary care evaluation increased 115%.

The TAP was then created as a tool to elicit observations via telehealth through clinician-guided, caregiver-led play interactions using simple items found in most homes (clinicaltrials.gov, NCT03847337; Corona et al., 2020; Corona et al., 2021). The TAP was created by applying a computational approach to a clinical registry dataset to identify key behaviors indicative of ASD, followed by adaptation and translation into guidelines for eliciting and observing child behavior. The design team operationalized 7 identified key features using Likert-scaled anchors, then developed a set of assessment activities designed to elicit these key behaviors. To complete the TAP, clinicians guide caregivers through administration using a synchronous telemedicine platform (i.e., Zoom). Clinicians score the child's behavior across seven behavioral domains (e.g., eye contact, repetitive play, etc.) using a 1-3 Likert scale tied to presence of concern. The clinician sums the seven item ratings into a total score (range 7-21), with scores of 11 or greater indicating elevated risk for ASD (AUC = 0.81; Wagner et al., 2021).

In the first phase of deployment/evaluation, we focused on feasibility and acceptability, with caregivers completing TAP activities with their children in the lab, with coaching from an expert clinician located in another lab space, via telehealth. Caregiver feedback indicated that most found the process easy to understand and felt comfortable doing TAP activities with their children (Corona et al., 2020). In the next phase, we compared tele-assessment to traditional in-person evaluation. In the clinical laboratory, remote clinicians guided caregivers through tele-assessment activities, and children then received in-person diagnostic assessments conducted by independent clinicians blinded to tele-assessment results. Remote clinicians achieved diagnostic agreement with in-person evaluations for 93% (115/123) of participants. Caregivers again reported high levels of satisfaction with the process, with 93% indicating that they would recommend it to others.

At the start of the COVID-19 pandemic, the TAP was deployed within direct-to-home tele-assessments by the VUMC clinical team (Wagner et al., 2021). Within a sample of 204 children and caregivers, clinicians noted clinical certainty necessary for diagnostic decision-making in 82% of cases (71% ASD, 11% other non-ASD developmental disorder). A subsample of families (n=43) completed a clinical survey on TAP usage, with many reporting that they understood what they would be doing, found the instructions easy to follow, found the interaction with their child comfortable, and would recommend the procedure to other families.

In the spring of 2020, we shared the TAP broadly with providers around the country in response to widespread need for tools that would permit ongoing care during pandemic-related disruptions to in-person clinic visits. Web-based TAP trainings drew an initial audience of more than 2,100 providers across the country in less than 2 weeks-time (Wagner et al., 2020; Wagner et al., 2021). The VUMC team provided additional interactive professional consultation to over 50 providers and fielded questions related to future implementation from an additional 90 providers. All participants who attended web-based TAP training were sent a survey on their use and perceptions of the tool. Completed surveys indicated a dramatic shift in the percentage of providers offering telemedicine (18% to 79%) in response to COVID. 56% reported using the TAP in practice (reflecting 113 unique sites), with 61% of these reporting comfort in coaching parents through TAP administration with only limited support from webinar and materials offered. Some 85% of respondents using the TAP indicated that they plan to continue using the TAP once normal clinical activities resumed, demonstrating the importance of further investigation and validation of its functioning across groups and clinical profiles. Archived versions of TAP



webinar and resources since the initial training in 2020 have now been accessed 6891 times across 2785 unique professionals.

Additional details regarding the impact and feasibility of this practice can be found in the Resources section.

## Section 2: Implementation Guidance

### COLLABORATORS AND PARTNERS

COLLABORATORS AND PARTNERS		
Partner/Collaborator	How are they involved in making the program work?	Does this stakeholder have lived experience/come from a community impacted by the practice?
Community providers	Pediatric and early intervention providers from the community provide feedback on referral processes and are primary sources of pre/post-evaluation care coordination	Community providers typically have the first and longest relationship with referred families.
Caregivers of children with autism or developmental concerns	Caregivers are asked to be active participants in the assessment of their child, both in providing developmental history and current concerns as well as facilitating key observations during TAP	Caregivers are the primary care providers for the children receiving services from the program
Developmental-Behavioral Pediatricians, Psychologists, and other evaluating professionals	ASD and developmental experts are involved in the design and refinement of the TAP and tele-diagnostic model.	Specialist providers perform diagnostic evaluations for families of children demonstrating characteristics of autism



Family Navigators and administrative support staff

Trained family navigators and staff assist in setting up appointments, priming families for evaluation procedures, and provide navigational supports pre/post evaluation.

Family navigators and staff represent families affected by disability care coordination and related barriers

## REPLICATION

Our general tele-diagnostic model grew from a partnership with our state's Part C early intervention system. Through this partnership our team was able to build a pilot model for families to be seen within their own communities by a remote ASD specialist who could provide diagnostic and targeted recommendations. Since this model relied on providers on each end of the camera, the caregiver-facilitated TAP was designed to create a model through which families could be seen at home or in any setting that had access to the internet, without a trained provider in-person with them.

In order to support direct-to-patient evaluations, a number of modifications were needed. This included clear communication loops from referring providers to tele-diagnostic clinicians and families. Our team established ongoing feedback sessions with referring EI agencies and pediatric partners to ensure families had appropriate information regarding options for evaluation, potential outcomes of the assessment, and intended next steps. This also included the scheduling team helping prepare the family for the appointment by sending information related to the assessment and potential resources, as well as in many cases, having caregivers submit developmental/social/medical history information prior to the appointment via REDCap.

## INTERNAL CAPACITY

Our use of the TAP tele-diagnostic model has been significantly bolstered by strong partnerships with our state leaders, Part C system, internal pediatric providers, and network of community providers. We have worked hard with our partners to make sure that families being referred for TAP tele-evaluations are prepared and primed for the appointment. This includes administrative support, pre/post-evaluation referrals to early intervention and family navigation/resources, and clear communication with partners post-diagnosis. Before we introduced tiered and tele-service models, we tried our best to communicate the need for the model, why the model addresses specific needs, and how the model provides additional options for families regarding receiving a diagnosis of ASD through different pathways. Many of these would be critical pre-requisites for other entities who intend to offer tele-evaluations on a broad scale.

## PRACTICE TIMELINE

Given that the practice can be implemented in different settings and across multiple systems, it is difficult to estimate timelines for each component. It can take a substantial amount of time to establish partnerships with community referral streams as well as disseminate protocols for referrals. Time must also be spent training administrative staff on how to schedule appointments with families and coordinate assessment materials and follow-up resources. It will be important for tele-diagnostic clinicians to become familiar with model,



administration of new tools, and administrative tasks (e.g., documentation, billing, routing of referrals). The TAP was designed to be a flexible tool to be embedded within tele-diagnostic evaluations. Depending on the infrastructure already built for telemedicine evaluations, practice implementation will vary. For more information on this practice's timeline and specific practice activities, please contact Dr. Jeff Hine directly at [jeffrey.hine@vumc.org](mailto:jeffrey.hine@vumc.org).

## PRACTICE COST

Access to the TAP is open-access and free. The tool and manual can be downloaded at <https://vkc.vumc.org/vkc/triad/tele-asd-peds>. Also on the website are archived webinars and scoring practice. Although the manual provides some recommendations, the TAP supports use of toys and materials that should be readily available in most homes/clinics. Targeted and more intensive trainings are available on an as-needed basis. For more information on this practice's startup costs and budgets, please contact Dr. Jeff Hine directly at [jeffrey.hine@vumc.org](mailto:jeffrey.hine@vumc.org).

## LESSONS LEARNED

A large challenge for our group has been difficulty with being able to fully identify what sub-groups of families and providers experience the most barriers when accessing tele-diagnostic services. Further study is needed to understand what facilitates successful uptake of tele-assessment, what barriers may preclude families from engaging, and how procedures should be modified based on stakeholder requirements and contextual factors to create coherent systems for specific communities. The next phase for our research includes more rigorous evaluation of the true impact of the TAP model and our ability to reduce and understand disparities. Further, we need to gather more stakeholder input to tailor the model based on the specific needs of systems-level providers and to identify and mediate potential unintended negative consequences. We designed and piloted the TAP model before the pandemic, and we could not have foreseen the massive need for such a tool as the impact of the pandemic surfaced. Thus, they are likely many steps that unfolded out of order during our initial validity/feasibility trials of the TAP. Obviously, we would have appreciated many more months to study and refine the TAP before widespread dissemination; however, we have learned a lot about the impact and need of such a tool/model. Validity, feasibility, and impact outcomes for the TAP model continue to emerge in a positive way, but we have always tried to ensure that users of the TAP are aware of its design features and emerging evidence as they choose to put the model in practice.

## NEXT STEPS

We have not yet fully validated the TAP for in-home use in a broader community sample with novel groups of diagnostic clinicians, nor have we demonstrated its potential value and impact for those families from disproportionality affected communities that are most likely impacted by existing barriers to traditional evaluation. Thus, we have secured a two-site grant to employ a family recruitment approach that emphasizes rural and medically underserved regions and populations, utilizing both community screening strategies as well as common ASD-concern referral pathways (e.g., state Part C early intervention systems; referrals from pediatric primary care providers). We will perform rigorous evaluation of the TAP and comparison to traditional in-person evaluation. We will continue to measure diagnostic accuracy and concurrent validity of the TAP in comparison to





standard tools for ASD assessment. We will then perform longitudinal evaluation of service access, family outcomes, and factors that affect clinician diagnostic certainty and family satisfaction. We will assess perceptions of tele-assessment value, service eligibility and access, and family outcomes (e.g., service engagement, caregiver empowerment and self-efficacy). We will examine family and child characteristics that affect use of the tool, procedures, satisfaction, and diagnostic confidence.

In addition, we intend to further involve a wider range of providers in the tele-diagnostic assessment. While the initial TAP rollout involved caregiver-facilitated observations, we will now start to involve providers that are typically on the frontlines of developmental assessment, i.e., pediatric providers, early intervention providers, medical residents and other learners. We also intend to broaden the range of settings in which the TAP is administered, including primary care clinics, other pediatric clinics (e.g., speech therapy), and regional early intervention centers. Along with this expansion we will continue to develop and improve virtual trainings and online learning modules to be able to disseminate quality stakeholder-informed learning resources.

## RESOURCES PROVIDED

- 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/>

- Adiani D, Schmidt, M., Wade, J., Swanson, A. R., Weitlauf, A., Warren, Z., & Sarkar, N. . Usability enhancement and functional extension of a digital tool for rapid assessment of risk for autism spectrum disorders in toddlers based on pilot test and interview data. In: *International Conference on Human-Computer Interaction*. Springer; 2019:13-22
- Corona L, Hine, J., Nicholson, A., Stone, C., Swanson, A., Wade, J., Wagner, L., Weitlauf, A., & Warren, Z. TELE-ASD-PEDS: A Telemedicine-based ASD Evaluation Tool for Toddlers and Young Children. 2020.
- Corona LL, Wagner L, Wade J, et al. Toward Novel Tools for Autism Identification: Fusing Computational and Clinical Expertise. *Journal of Autism and Developmental Disorders*. 2021.
- Corona LL, Weitlauf AS, Hine J, et al. Parent Perceptions of Caregiver-Mediated Telemedicine Tools for Assessing Autism Risk in Toddlers. *Journal of Autism and Developmental Disorders*. 2020;51:476-486.
- Juárez AP, Weitlauf AS, Nicholson A, et al. Early Identification of ASD Through Telemedicine: Potential Value for Underserved Populations. *Journal of Autism and Developmental Disorders*. 2018;48(8):2601-2610.
- Stainbrook JA, Weitlauf AS, Juárez AP, et al. Measuring the service system impact of a novel telediagnostic service program for young children with autism spectrum disorder. *Autism*. 2019;23(4):1051-1056.
- Wagner L, Weitlauf, A.S., Hine, J., Corona, L.L., Berman, A.F., Nicholson, A., Allen, W., Black, M., & Warren, Z. Transitioning to telemedicine during COVID-19: Impact on perceptions and use of telemedicine procedures for the diagnosis of autism in toddlers. *Journal of Autism and Developmental Disorders*. 2021.
- Wagner L, Corona LL, Weitlauf AS, et al. Use of the TELE-ASD-PEDS for Autism Evaluations in Response to COVID-19: Preliminary Outcomes and Clinician Acceptability. *Journal of Autism and Developmental Disorders*. 2020.
- Wagner L, Stone, C., Wade, J., Corona, L., Hine, J., Nicholson, A., Swanson, A., Vehorn, A., Weitlauf, A., & Warren, J. *TELE-ASD-PEDS User's Manual*. Vanderbilt Kennedy Center Treatment and Research Institute for Autism Spectrum Disorders; 2021.

