**Executive Summary: Increasing Autism Spectrum Disorder Screening**

**and Referrals in a Pediatric Clinic**

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**Problem Statement and Significance**

According to the Centers for Disease Control and Prevention (CDC) (2019), developmental delays occur in approximately 5% to 15% of all children. Without the use of standardized screening tools, 70% of those with developmental delays are not properly diagnosed. This also postpones intervention and treatments for those patients with developmental concerns (Agarwal et al., 2020). There has been a marked increase over the last ten years of patients with developmental delays given a concurrent diagnosis on the autism spectrum. According to the most recent estimates, 1 out of 59 children has a diagnosis of autism spectrum disorder (ASD) (CDC, 2019).

The earlier the ASD diagnosis can be made, the earlier intervention, therapies, and support can be provided for the child. The development of the Modified Checklist for Autism in Toddlers, Revised with Follow-up (MCHAT-R/F; Robins, et al., 2014) has shown to be statistically reliable in helping to diagnose children as young as 18-months of age with ASD. The utilization of the MCHAT-R/F screening tool has allowed for diagnosis to occur two years ahead of the national median diagnostic age for ASD, which has provided the opportunity for earlier intervention and support for these patients and their families (Robins et al., 2014). An additional screening tool, the Ages and Stages Questionnaire (ASQ 3; Agarwal, et al., 2020) is also encouraged at 18- and 24-months in conjunction with the MCHAT-R/F to further assess the presence of developmental delay and behavioral concerns.

The screening process can be considered logistically cumbersome. The MCHAT-R/F and ASQ 3 assessments have multiple, detailed developmental questions for the parents to answer about their child’s current abilities and behaviors. There are also open-ended questions regarding family history and any other concerns the parents may have about their growing child’s development and behaviors (Yuen et al., 2018). The parents are typically given these tools to complete while waiting for the healthcare provider (i.e., physician or nurse practitioner) to come into the room for their well-child exam. The task of concentrating on these questions and responding, all while caring for a toddler often prove difficult, with the parent frequently leaving the tool unfinished when the healthcare provider enters the room for the examination (Fenikile et al., 2015). Optimally, the MCHAT-R/F and ASQ 3 data would be available during the visit with the healthcare provider so that scoring can be completed and areas of concern addressed with the parent during the visit. According to a study by Salisbury et al. (2017), when the tools are completed prior to the examination, education and dialogue can occur in real time with the healthcare provider and the parent.

Therefore, the primary purpose of this project was to improve the current MCHAT-R/F and ASQ 3 screening process; to facilitate early screening of children for autism and developmental delays at 18-months and 24-months at their well-child exams; and to support necessary referrals for those children who score as borderline on developmental milestones or score as high risk for autism on the MCHAT-R/F and/or ASQ 3 screening.

**Methodology**

**Setting**

This study took place at North Central Indiana Pediatric Center, the largest pediatric clinic affiliated with Community Hospital Network in Central Indiana. The pediatric office employs four pediatricians, four certified pediatric nurse practitioners, eight medical assistants, four front office staff, four triage nurses, a clinical nurse supervisor, a front office supervisor, and a practice administrator. This pediatric office is a growing practice, currently caring for over 11,000 pediatric patients in the North-Central Indiana region.

**Study Design**

A quality improvement (QI) approach was utilized to address the proposed outcome measures for this study. Edward Deming’s Plan-Do-Study-Act model provided a framework for the quality improvement process (Donnely & Kirk, 2015). The first goal was to increase the number of completed MCHAT-R/F and ASQ 3 screenings by at least 5% at the 18- and 24-month well-child visits (total). For purposes of data collection, the 18- and 24 month screenings were combined when evaluating the pre- and post-data for completion of the MCHAT-R/F and ASQ 3. The second goal was to increase the number of appropriate referrals made by at least 5% based on the MCHAT-R/F and ASQ 3 scores. The third goal was to obtain the affected healthcare providers’ evaluation of the intervention by use of social validity questionnaire.

**Pre-Intervention**

The healthcare clinic where this quality improvement study took place utilized the MCHAT-R/F and ASQ 3 at each 18-month and 24-month well-child visit. The current practice in the clinic was for the Medical Assistant (MA) to ask the MCHAT-R/F questions verbally as they prepared the patient for the provider in the examination room and obtained the vital signs and history. The MA left a laminated copy of the ASQ 3 screening tool, which is over six pages, for the parent to complete with a dry erase marker upon leaving the room. Often the child was upset, crying, or screaming, making completion of the developmental screening difficult to complete (Maaks et al., 2020). The completed screening tool was placed in the provider’s folder for review after the patient left the clinic. The provider made the necessary referrals for those children who scored as borderline on developmental milestones or scored as high risk for autism on the MCHAT-R/F and/or ASQ 3 (Monteiro et al., 2019).

A retrospective chart review of 200 patient records was conducted to evaluate pre-intervention screening and referral data. The patient records were randomly selected utilizing an electronic medical record (EMR) generated report of 18- and 24-month well-child visits. Due to the COVID pandemic creating barriers to face-to-face visits in the office for several weeks during the spring and summer of 2020, the random chart review included patients from January 2020 to January 2021.

**Intervention**

 For the process improvement intervention, the parent was sent the MCHAT-R/F and ASQ-3 screening tools in the mail to their home, to be completed prior to the patient coming in for their 18- or 24-month well-child exam. When the parent called to schedule the well-child exam, the staff addressed an already prepared envelope using the home address obtained in the medical record, and inserted the MCHAT-R/F and ASQ 3 screening tools and the informed consent document. Instructions on how to complete the forms were included on the screening tools. As part of the check-in process when the patient arrived for their well-child exam, the front office staff verified whether the assessment was completed. If not completed, the parent was given a paper copy to complete in the waiting room and/or exam room prior to the provider coming in for the visit. The provider was notified if the parent did not complete the tool prior to the visit, and the parent was allowed a few minutes to complete the forms.

**Post-Intervention**

February 15, 2021 marked the first appointments affected by the new process improvement intervention. A retrospetive chart review of 100 percent of patients from February 15 to May 15, 2021 (170 charts) was conducted to evaluate post-intervention screening and referral data. All patient charts, pre- and post-intervention, were evaluated and compared using the following variables: 1) age of patient, 2) gender of patient, 3) race/ethnicity, 4) MCHAT-R/F completion at 18- and 24-months, 5) ASQ 3 completion at 18- and 24-months, and 6) necessary referrals made for those who scored as borderline on developmental milestones or scored as high risk for autism on the MCHAT-R/F and/or ASQ 3 screening. The healthcare providers were given a social validity questionnaire to complete post intervention. This was done to assess the feasibility of the intervention, ability to maintain intervention, likes and dislikes of the new process, and any recommendations for the future.

**Data Analysis**

 Table 1 outlines the sample demographics (i.e., age at screening, gender, and race-ethnicity) for the pre- and post-intervention chart reviews, the pre- versus post-intervention data for the MCHAT-R/F and ASQ 3 screenings, and pre- and post-intervention referral data. A two-sample independent proportion's test was used to evaluate statistical significance for all applicable data points using the Z standard normal distribution. The hypothesis testing results were evaluated from the view of a one-sided p-value with the statistical significance level set to 5%. A one-sided p-value was chosen, as it was expected that the intervention would result in an increase in percentage for MCHAT-R/F, ASQ 3, and referrals completed.

**Results**

 For the first data point, the pre- and post-MCHAT-R/F completion rates were compared using a two-sample independent proportions test, resulting in a p-value of 0.01. For the second data point, the pre- and post-ASQ 3 completion rates were compared using a two-sample independent proportions test, resulting in a p-value of 0.07. The goal of increasing the MCHAT-R/F screenings at 18- and 24-months was achieved, as the completion rate went from 97% at pre-intervention to 100% at post-intervention. The goal of increasing the ASQ 3 screenings at the 18- and 24-months by at least 5% fell short at 4.1%. The post-intervention data did demonstrate that 45.9 percent (n=78) of MCHAT-R/F’s were completed prior to the visit and 45.3 percent (n=77) of the ASQ 3 assessments were completed prior to the visit.

Improving necessary referrals based on the MCHAT-R/F and ASQ 3 scores by at least 5% was the second goal of this intervention. Those patients who scored as ‘borderline’ and/or ’referral indicated’ on the MCHAT-R/F and ASQ 3 are recommended to be referred to specialty services (i.e. physical therapy, occupational therapy, speech, autism evaluation, etc.) based on which area is indicated for referral (Monteiro, et al., 2019). By using a two-sample independent proportions test, the number of referrals sent for ‘borderline’ scores compared from pre- and post-intervention resulted in a p-value of 0.20 indicating there was not a statistically significant increase. An additional two-sample independent proportions test was done to compare the pre- and post-intervention rate for referrals sent for those that scored as ‘referral indicated’. This test resulted in a p-value of 0.04 indicating that there was a statistically significant increase in the referral rate for this group. The second goal of this quality improvement project was achieved with ‘borderline’ referrals improving by 6.6% (although not a statistically significant increase and therefore possibly due to random chance) and ‘referral indicated’ referrals improving by 24.2% when comparing pre- to post-intervention data.

The third goal was to obtain the affected healthcare providers’ evaluation of the intervention by use of social validity questionnaire. Table 2 provides a breakdown of the social validity assessment questions and associated answers. Seven of the eight healthcare providers were evaluated. All seven of the providers given the social validity questionnaire completed it in its entirety. They all (100%) agreed that the project was feasible for the pediatric practice, while only six (85.7%) believed the intervention could be maintained long-term. Some of the comments about the intervention were as follows: 1) the intervention freed up the staff to do other tasks (14.3%), 2) allowed for uninterupted time for parents to complete assessment (28.6%), 3) parents were more thorough with filling out the assessment (42.9%), and 4) doing the evaluation before saved time during the patient visit, allowing more time with the provider (28.6%). Providers also shared that many parents complimented the intervention, stating that it allowed them uninterupted time to complete the screenings as well as allowing them the opportunity to carry out some of the questions on the screening tools that they may not otherwise have known the answer to, as their child had never done the task prior.

**Discussion**

The purpose of this quality intervention was to improve the MCHAT-R/F and ASQ 3 screening process, as well as improve the necessary referrals made for those that scored as borderline or at high risk for autism on the MCHAT-R/F and/or ASQ 3 screening. The data obtained from this study demonstrated a statistically significant increase in the number of MCHAT-R/F’s completed at 18- and 24-month well child exams, but failed to achieve a 5% improvement in the number of ASQ 3 screenings, The intervention also resulted in an increased number of referrals made for those patients that scored as borderline or at high risk of autism.

Prior studies have shown that with some minor changes, the this QI project intervention can be improved. A qualitative study performed by Lynch et al. (2015) set out to improve the developmental screening rate for children utilizing the intervention of mailed MCHAT-R/F and ASQ 3 questionnaires to the patient’s homes prior to their 18-month and 24-month well child exams. While mailing the screening tools to the patients’ homes did not prove to be a successful intervention initially, they found that when the nurse in the office provided a call to the patient to follow up on the screening tool completion, they had a higher response rate and were able to improve their developmental screening rate (Lynch et al., 2015). The nurse would reach out with a reminder letter two weeks prior to the appointment to ensure the tool had been completed and mailed back. If still not received within a week of the appointment, the nurse would call and verbally remind the patient. The reminders resulted in a 59.3% increase in completion of the screenings (Lynch et al., 2015).

An additional study by Sturner et al. (2017) evaluated the efficacy of digitalized screening tools versus use of paper screening tool forms for the MCHAT-R/F and ASQ 3. Their study revealed that the use of digital technology for the MCHAT-R/F and ASQ 3 allowed for ease in scoring for the parent, as well as improved accuracy of screening tabulation for the staff and healthcare providers (Sturner et al., 2017). Utilizing the results from the current QI project, along with the data from previous studies, allows for further evaluation and modification to allow for future success with this intervention.

**Limitations**

The efficacy of the intervention was hindered by the fact that the forms were mailed instead of sent electronically. Some patients did not receive the forms in time for their appointments, some set them aside and forgot about them, while others filled them out and accidentally left them at home. There were also no follow up calls as a reminder for the parents to bring the forms. By utilizing the results of this study, the hospital network is working on finding a way to send the MCHAT-R/F forms and a form similar to the ASQ 3 through the patient portal to be completed electronically prior to the patient’s appointment.

**Implications**

**Systems**

The initial screening for autism is performed in the primary care office setting. The AAP (2007) recommends the development of the child be closely monitored at each well-child visit, looking particularly at developmental delays, as well as dialogue with the parent regarding concerns they have about the child’s development and behavior, and assessing for any family history of autism or other developmental diagnoses. If the child screens as high risk for autism on the MCHAT- R/F and/or ASQ 3, the primary care provider then refers the child to a clinical psychologist for official diagnosis. Most often, the clinical psychologist is located at an autism center. Once the official diagnosis has been made, the child is referred back to their primary care provider, who will then refer the patient for the appropriate therapies. Applied Behavior Analysis (ABA) therapy is the AAP recommended therapy of choice for patients diagnosed on the autism spectrum, although additional therapies (i.e., physical therapy, occupational therapy, speech, etc.) may be needed (Johnson, Myers, Council on Children with Disabilities, 2007). Due to the volume of patients being referred for ABA therapy, the wait list for an appointment can average several months (Smith-Young, Chafe, & Audas, 2020). This is another reason to recognize early warning signs and refer early if the results of the MCHAT-R/F or ASQ 3 indicate a need for referral. Studies have shown that those children diagnosed with autism before age three years and receive early intervention and therapies have improved outcomes as compared to those diagnosed and treated after age three (Sanchez-Garcia et al., 2019).

**Policy**

In 2016, due to the rising number of children diagnosed with autism spectrum disorder, the United States Preventative Services Task Force shared a strong recommendation that there be a universal screening to help detect ASD in young children, specifically those three years of age and younger. (U.S. Department of Health & Human Services, 2015). The American Academy of Pediatrics (AAP; Zwaigebaum et al., 2015) has a list of recommended tools, including the MCHAT-R/F and ASQ 3, for use at the 18- and 24-month well-child exams to assess for developmental and autism screening. The AAP does not outline the process for obtaining the screening during the visit, allowing the clinical practice to find a workflow that works best for them (Zwaigebaum et al., 2015).

 The Obama administration included important policy for ASD in the Affordable Care Act. The important provisions included protection for patients with ASD, as it is considered a pre-existing condition for most insurance providers. The new legislation prevents insurers from denying coverage for ASD patients and necessary therapies related to the diagnosis (CDC, 2020). This coverage includes screening at the 18- and 24-month well-child exams. The cap for coverage was also removed for ongoing therapies associated with ASD, allowing patients to get their needed therapy without parents having to pay out of pocket costs once they met their limit. The new revisions also allowed those affected with ASD more insurance coverage options once they age out of coverage on their parents’ insurance plans (CDC, 2020).

**Economic**

A study done by Leigh and Du (2015) estimated the economic burden over a ten year span of time for ASD. As of 2015, the annual medical expenditures, associated non-medical costs, and productivity expenses affiliated with ASD were estimated at $268 billion per year. The economic burden in 2015 was in line with the costs of those with diabetes and Attention Deficit Hyperactivity Disorder (ADHD), and the expenses associated with ASD exceeded those for stroke and hypertension. A statistical estimation of ASD costs ten years later, taking into account the rising number of those diagnosed with ASD, was found to far exceed the estimates for diabetes and ADHD, coming in at an estimated $461 billion per year (Leigh & Du, 2015).

Early detection of ASD has received much attention nationally, and even at a global level, as evidence continues to demonstrate that early intervention can improve the prognosis of those diagnosed. The most feasible way to obtain these screenings is from the child’s primary healthcare provider. Screening tools, such as the MCHAT-R/F and ASQ 3, are not associated with any cost to the patient, and they can be administered by the primary healthcare provider, as recommended by the AAP, at the 18- and 24-month well-child exams (Monteiro et al., 2019). Early intervention and therapies, with their associated improved outcomes, could indicate a decrease in needed services as the child grows older.

**Practice**

These screening tools are indeed time-consuming, and to provide the necessary attention the tool needs, it is beneficial to have the information filled out prior to the visit. There is still much debate on the best way to screen for ASD; however, using a two-tool method is highly recommended, specifically utilizing a broad screening followed by a more in-depth screening (Bilszta & Bilszta, 2012). The MCHAT-R/F is a level one screening tool to be utilized to assess developmental delays in children at 18-months and 2 years of age. These two age groups have been identified based on significant research and clinical study. Most children who are not diagnosed with ASD have already mastered the developmental tasks of pretend play, pointing, and appropriate eye contact and interaction by 18-months of age. Doing the first screening at 18-months allows for early detection of developmental delays and possible autism. Another screening is done at 24 months to try and catch those who may have been missed at the 18-month screening or those who have regressed since the last screening, which could also indicate a risk for ASD (Bilszta & Bilszta, 2012).

Due to the importance of these screenings, healthcare providers need to find what method of screening works best for their population of patients given the time they have allowed to meet with the patient during the well-child exam, schedule limitations, and any other barriers that may exist to prevent thorough completion of the screening tools. Careful attention needs to be paid to the screening results, particularly looking at those scored as borderline or at risk for ASD. Necessary referral should be made for those indicating developmental delay or need for ASD testing. Doing so will allow for early intervention for those affected.

**Conclusion**

The findings from this quality improvement project demonstrated that there is value in having the MCHAT-R/F and ASQ 3 completed prior to the 18-month and 2-year well-child exam. Doing so allowed the provider more time with the patient and parent for assessment and discussion. It allowed the provider to have the data in advance of the appointment. The screenings were less rushed and found to be more thorough and complete if done at home. MCHAT-R/F completion at the 18- and 24-month well child exams reached a 100% completion rate. There were a greater number of referrals sent during the post-intervention time period for those that scored borderline and high-risk for autism on the MCHAT-R/F and/or ASQ 3. There is still improvement to be made regarding the number of ASQ 3 screening tools completed at the 18- and 24-month well child exams.

**References**

Agarwal, P., Xie, H., Rema, A., Rajadurai, V., Lim, S., Menaney, M., & Daniel, L. (2020).

 Evaluation of the ages and stages questionnaire (ASQ 3) as a developmental screener at

 9, 18, and 24 months. *Early Human Development*, 147: 1-7.

Bilszta, S. & Bilszta, J. (2012). Early detection of autism: A comparison of the Checklist for

 Autism in Toddlers and the Modified Checklist for Autism in Toddlers. *Journal of*

 *Pediatrics and Child Health*, 49 (2013): 438-444.

Bozkurt, G., Uysal, G., & Duzkaya, Duygu (2019). Examination of care burden and stress coping

 styles of parents of children with autism spectrum disorder. *Journal of Pediatric Nursing,*

47: 142-147.

Campbell, K., Carpenter, K., Espinosa, S., Hashemi, J., Qui, Q., Tepper, M., Cadlerbank, R.,

 Sapiro, G., Egger, H., Baker, J., & Dawson, G. (2017). Use of digital M-CHAT-R/F to

 improve quality of screening for autism.  *The Journal of Pediatrics*, 183, 133-139.

Centers for Disease Control and Prevention (2019, September 3). Data & statistics on autism

spectrum disorder. *Autism Spectrum Disorder (ASD)*.

<https://www.cdc.gov/ncbddd/autism/data.html>

Centers for Disease Control and Prevention (2020, February 11). Screening and diagnosis of

 autism spectrum disorder for healthcare providers. *Autism Spectrum Disorder (ASD).*

<https://www.cdc.gov/ncbddd/autism/hcp-screening.html>

Donnely, P. & Kirk, P. (2015). Use the PDSA model for effective change management. *Education*

 *for Primary Care*, 26: 279-281.

Fenikile, T., Ellerbeck, K., Fillipi, M., & Daley, C. (2015). Barriers to autism screening in family

 medicine practice: a qualitative study. *Primary Health Care Research and Development*,

 16: 356-366.

Johnson, C., Myers, S., & Council on Children with Disabilities (2007). Identification and

 evaluation of children with autism spectrum disorders. *American Academy of Pediatrics*,

 120(5): 1183-1215.

Leigh, J. & Du, J. (2015). Brief report: forecasting the economic burden of autism in 2015 and

 2025 in the United States. *Journal of Autism & Developmental Disorders*, 45 (12): 4135-

 9.

Lynch, B., Weaver, A., Starr, S., Ytterberg, K., Rostad, P., Hall, D., & Tuckers, S. (2015).

 Developmental screening and follow-up by nurses. *MCN American Journal of Maternal*

 *Child Nursing*, 40 (6): 388-393.

Maaks, D., Starr, N., Brady, M., Gaylor, N., Driessnack, & Duderstadt, K. (2020). Burn’s Pediatric

 Primary Care: 7TH Edition. Elsevier.

Monteiro, S., Dempsey, J., Berry, L., Voigt, R., & Goin-Kochel, R. (2019). Screening and referral

 practices for autism spectrum disorder in primary pediatric care. *Journal of the*

 *American Academy of Pediatrics*, 144(4), 1-9.

Riva, J., Malik, K., Burnie, S., Endicott, A., & Busse, J. (2012). What is your research question? An

 introduction to the PICOT format for clinicians. *Journal of Canadian Chiropractic*

 *Association*, 56 (3), 167-171.

Robins, D., Casagrande, K., Barton, M., Chen, C., Dumont-Mathieu, T., & Fein, D. (2014). *Journal*

 *of the American Academy of Pediatrics,* 133(1), 37-45.

Salisbury, L., Nyce, J., Hannum, C., Sheldrick, C. & Perrin, E., (2018). Senstivity and specificity of

 2 autism screeners among referred children between 16 and 48 months of age. *Journal*

 *of Developmental and Behavioral Pediatrics*, 39:254-258.

Sanchez-Garcia, A., Galindo-Villardon, P., Nieto-Librero, A., Martin-Rodero, H., & Robins, D.

 (2019). Toddler screening for autism spectrum disorder: a meta-analysis of diagnostic

 accuracy. *Journal of Autism Developmental Disorders*, 49, 1837-1852.

Smith-Young, J., Chafe, R., & Audus, R. (2020). Managing the wait: parent’s experiences in

 accessing diagnostic and treatment services for children and adolescents diagnosed with

 autism spectrum disorder. *Health Services Insights,* 12, 1-10.

Sturner, R., Howard, B., Bergmann, P., Morel, T., Landa, R., Walton, K., & Marks, D. (2017).

 Accurate autism screening at the 18-month well child visit requires different strategies

 than at 24 months. *Journal of Autism and Developmental Disorders*, 47(10), 3296-3310.

Toh, T., Tan, V., Lau, P., & Kiyu, A. (2017). Accuracy of Modified Checklist for Autism in Toddlers

 (M-CHAT) in detecting autism and other developmental disorders in community clinics.

 *Journal of Autism and Developmental Disorders*, 48 28-35.

United States Department of Health & Human Services (2015, April 9). The Affordable Care Act

 and autism related conditions. *Autism.*

[https:///www.hhs.gov/programs/topic-sites/autism/aca-and-autism/index.html](https://www.hhs.gov/programs/topic-sites/autism/aca-and-autism/index.html)

Yuen, T., Penner, M., Carter, M., Szatmari, P., & Ungar, W. (2018). *Developmental Medicine and*

 *Child Neurology, 60: 1093-1100.*

Zwaigenbaum, L., Bauman M., Fein, M., Pierce, K., Buie, T., Davis, P., Newschaffer, C., Robins,

 D., Wetherby, A., Choueiri, R., Kasari, C., Stone, W., Yurmiya, I., Estes, A., Hansen, R.,

 McPartland, J., Natowicz, M., Carter, A., Granpeesheh, D., Mailoux, Z., Roley S., &

 Wagner, S. (2015) Early screening of autism spectrum disorder: recommendations for

 practice and research. *Pediatrics*, 136 (1): S41-S59.

Table 1: Pre-Intervention vs. Post-Intervention

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **Pre-Intervention****N=200** | **Post- Intervention****N = 170** | **P-Value** |
| Age at screening, n (%) 18-months 24-Months  |  55145 | (27.5)(72.5) | 9773 | (57.1)(42.9) | --- |
| Gender, n (%) Male Female |  96104 | (48)(52) | 8981 | (52.4)(47.6) | --- |
| Race/Ethnicity, n (%) White/Non-Hispanic or LatinBlack/African American/Non-Hispanic or LatinHispanic/Latin AmericanAsian/Non-Hispanic or Latin | 191  7 2 0 | (95.5)(3.5)(1)(0) | 159641 | (93.5) (3.5) (2.4) (0.6) | --- |
| MCHAT-R/F Screening, n (%) Completed Not Completed |  194 6 | (97)(3) | 1700 |   (100) (0) | 0.01 |
| ASQ Screening, n (%) Completed Not Completed |  180 20 | (90)(10) | 16010 | (94.1) (5.9) | 0.07 |
| Referral Status, n (%)

|  |
| --- |
| Borderline: Referral SentBorderline: Referral Not SentReferral Indicated: Referral SentReferral Indicated: Referral Not Sent |
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 | 1211510 | (4.5)(95.5)(60)(40) | 32716 3 | (11.1)(88.9)(84.2)(15.8) | 0.200.04 |

Table 2: Social Validy Questionnaire Results from Providers (N=7)

Variables (n=7), n(%)

Role

 Physician 4 (57.1)

 Nurse Practitioner 3 (42.9)

The intervention was feasible

 Yes 7(100)

 No 0 (0)

The intervention can be continued and maintained

 Yes 6 (85.7)

 No 1 (14.3)

Likes about Intervention

 Uninterrupted time for parents to complete 2 (28.6)

 Freed up staff for other purposes 1 (14.3)

 Parents did a more thorough assessment 3 (42.9)

 Saves time in office 2 (28.6)

Dislikes about Intervention

 Since done on paper, could not always see prior to visit 1 (14.3)

 Parents forgot to bring forms to appointment 5 (71.4)

 Would prefer an electronic method 1 (14.3)

Intervention Improvement Recommendations

 Have scanned in EMR prior to visit 1 (14.3)

 Electronic forms versus in the mail 2 (28.6)

 More reminder calls prior to visit 1 (14.3)

 None 3 (42.9)