Increasing Autism Spectrum Disorder Screening Utilizing a Standardized Screening Tool: A Quality Improvement Project

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NURS 703A: DNP Project Planning

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Abstract

Autism Spectrum Disorder (ASD) is a growing health concern within the pediatric population in the United States. Over the past 5 years, there has been an increasing prevalence of ASD and yet many children remain undiagnosed (Willis et al., 2020; Liu et al., 2023). In addition, racial and ethnic disparities in access to ASD screening exist. Disparities prevalent among minority racial and ethnic groups with regard to ASD are most evident in the early identification of autism and the allocation of resources. (Liu et al., 2023). The burden of disease is significantly higher in American Indian, Alaska Natives, Black and Hispanic individuals who have less access to resources compared to White children diagnosed with autism (Liu et al., 2023). Variability in screening recommendations is an additional contributing factor to the under-diagnosis of ASD in children (Sobieski et al, 2022). Presently, no recommendation has been issued by any major organization endorsing one standardized screening tool over another (Monteiro et al., 2019). The most widely studied and utilized tool for ASD screening in the clinical setting is The Modified Checklist for Autism in Toddlers (M-CHAT-R/F) (Monteiro et al., 2019; Levy et al., 2019). This quality improvement project aimed to improve ASD screening in an underserved Native American population through the use of a standardized screening tool. The electronic medical record (EMR) was used to incorporate the M-CHAT-R/F as prompt reminder to screen eligible patients. The number of Autism screenings was used as a measure of change before and after implementation of the M-CHAT-R/F screening tool. Overall, the study findings suggested an increase in the number of eligible children who were screened for ASD following the implementation of M-CHAT-R/F into the EMR.

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Problem Description

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that involves multiple genetic and environmental factors. Common features involve deficits in social communication, social interactions and patterns in behavior which are repetitive and restrictive in nature (Kodak & Bergmann, 2020; Crowell et al., 2019). ASD manifests on a continuum with varying degrees of severity relating to social skill, speech development and behavior (Sobieski et al, 2022).

The Centers for Disease Control and Prevention, in their 2018 autism and developmental disabilities monitoring (ADDM) network report, estimated that the prevalence of ASD in the United States is 1 in 44 children, while the World Health Organization (WHO) estimates that ASD occurs in 1 in 160 children worldwide (Centers for Disease Control and Prevention [CDC], 2022; Sobieski et al, 2022). Over the past 5 years there has been an increasing prevalence of ASD yet many children remain undiagnosed (Liu et al., 2023). Moreover, variability in screening recommendations has added to the under-diagnosis of ASD in children (Sobieski et al, 2022). The American Academy of Pediatrics currently recommends the use of screening tools as part of developmental surveillance at well-child visits. Conversely, the US Preventative Services Task Force reported that there was insufficient evidence to endorse universal screening in children that do not present symptoms consistent with ASD or where there is an absence of parental concern (Levy et al., 2019). This discrepancy in screening recommendations is an added factor to the complexity in diagnosing ASD.

An additional barrier to early diagnosis of ASD is the limited implementation of a universal screening tool. To date, no recommendation has been issued by any major organization regarding a specific standardized screening tool. However, the most utilized and studied screening tool for ASD screening is The Modified Checklist for Autism in Toddlers (M-CHAT-R/F) (Monteiro et al., 2019; Levy et al., 2019). It is reliable in detecting toddlers who exhibit symptoms that positively correlate with ASD diagnosis once a positive screen is identified (Monteiro et al., 2019; Sobieski et al., 2022). The site chosen for implementation of this quality improvement project currently serves a large underserved pediatric population and while well-child exams are performed at recommended intervals; the providers at this site have not reached an agreement on a standardized tool to use among all providers. Based on this identified need, an improvement project was discussed with the goal of increasing ASD screening rates using a standardized screening tool.

Available Knowledge

Throughout the literature, the intervention most positively correlated with increased autism spectrum disorder (ASD) screening uptake is the standardized screening for ASD at 18 months and 24 months of age followed by ongoing developmental surveillance. The use of universal screening has been shown to increase ASD screening rates in the primary care setting (Hine et al., 2020; James & Smith, 2020; Steinman et al., 2022). In accordance with the American Academy of Pediatricians, children should be screened for ASD at 18 months and 24 months using a standardized and validated screening tool (American Academy of Pediatrics [AAP], 2021). While screening for ASD based on provider clinical judgement alone has proven to be useful, a recent study suggested that standardized screening is more accurate than clinical

judgement alone in identifying children with autism (James & Smith, 2020). Furthermore, a scoping review by Sobieski et al., looked at culture specific and language adapted tools used in the primary care setting. The primary aim was the identification of screening tools with a full validation process, high psychometric properties and cultural adaptations which could increase early identification of ASD and the review determined that M-CHAT is an effective diagnostic tool (Sobieski et al., 2022). Additionally, children who screen positive should be referred for early intervention services, audiology and for comprehensive ASD evaluation (Wallis et al., 2019). Overwhelmingly, data shows that utilizing standardized universal screening at the ages of 18 months and 24 months is vital to increasing screening rates. A prompt diagnosis leads to early intervention which is critical to improved lifelong therapy outcomes. One intervention helpful in facilitating standardized screening is imbedding an alert for screening in the electronic medical record (EMR).

The use of a standardized screening tool imbedded into the EMR and added EMR prompts during well child exams has been studied and suggested as an effective intervention to increasing early detection of ASD in young children (Campbell 2021; Steinman et al., 2022). In a QI study published by Campbell et al., (2021), well-child visits for children aged 16 months to 30 months were studied over a 2-year span, and EMR data containing screening forms, screening results and demographic information regarding ASD were extracted and analyzed to measure the proportion of visits in which screening was performed (Campbell et al., 2021). The researchers concluded that the use of an electronic system with prompts that remind providers and staff to screen toddlers for ASD, increases screening rates and early detection and reduces referral wait times (Campbell et al., 2021; Steinman et al., 2022; Jackman et al., 2020).

Rationale

To address low ASD screening rates at this rural clinic, the Institute for Healthcare Improvement (IHI) Model for Improvement (MFI) was utilized to format the clinical improvement process. The MFI has been extensively researched and repeatedly found to be a useful tool in quality improvement projects (Crowl et al., 2015). In adherence to the MFI, and through interviewing providers at the clinic, it was evident that there was a lack of a standardized process for ASD screening, which presented an opportunity for clinical quality improvement project. Clinic providers identified the need for a standardized screening tool and expressed interest in implementing the use of this tool. The literature review strongly suggested universal standardized screening as an effective method to increasing ASD screening rates among children aged 18 months and 24 months. Based on the findings from the literature review, it was determined that the M-CHAT-R/F is the most widely studied, validated, and reliable tool for ASD screening in the pediatric population. Through the analysis of cause and effect (Appendix D) leading to low screening ASD rates among children, we identified that providers expressed concern with their proficiency and knowledge regarding scoring and use of the M-CHAT-R/F tool. Other identified barriers included lack of pediatric providers, busy schedules, and the lack of parental knowledge of symptoms consistent with ASD. Moreover, the EHR has not been utilized as a reminder for providers to screen for ASD during well-child exams.

Specific Aims

The overarching goal was to increase the number of children aged 18 months and 24 months who were screened for ASD during well child exams using M-CHAT-R/F as the standard tool.

The aim of this project was to increase ASD screening in children aged 18 months and 24 months by 20% within two months of implementing universal standardized ASD screening.

Context

The clinic in which this project was implemented is in rural Umatilla County Oregon. The clinic had no affiliation to other large healthcare organizations in Umatilla County. The clinic is a non-profit organization tribal health center part of the Indian Health Services and provides an array of services including family primary care, dental services, behavioral health, and pediatric care. The clinic employs three physicians, a locum physician, one physician assistant, two nurses and four medical assistants alongside one information technology employee. The clinic is opened Monday through Friday 7:30Am to 4:30pm; appointments are scheduled between 7:30am to 12pm with an hour off for lunch, then again open from 1pm to 4:30pm. Each appointment is allotted for 30 minutes, and this allows each provider the opportunity to see 16 patients per day. The clinic averages 60 to 80 patient visits per day, roughly 25% of which are pediatric visits. Currently, there is only one clinician who routinely sees pediatrics patients and whom most pediatrics patients are assigned to. The clinic does not have a standardized process for ASD screening and a consensus has not been reached regarding which screening should be used in the clinic. Furthermore, while an electronic health record (EHR) is available, to date no ASD screening tool has been incorporated into the EHR. Some providers relay on parents reporting concerns regarding their child's behavior.

Intervention

The MFI's Plan-Do-Study-Act (PDSA) was utilized as the format intervention for this quality improvement project. Baseline data was collected through chart reviews of eligible

children over 2 months to determine the number or patients' who were screened for ASD at 18 months and 24 months well child visits prior to the intervention. Subsequently, an educational training on how to use and score the M-CHAT-R/F was provided to an all staff meeting. All employees belonging to the medical team had access to this training. This ensured a uniformity in knowledge to screen for ASD. Training consisted of a Power Point presentation that discussed advantages to the use of the M-CHAT-R/F as an appropriate tool and included examples on scoring using this tool (Appendix F). IT personnel were consulted to develop an automatic prompt in the charts of toddlers aged 18 months to 24 months with upcoming well-child visits. The prompt became visible to all staff that came in contact with the patients EMR which prompted the medical assistant rooming the patient to review the MCHAT with the parent or guardian. When the provider opened the patient's chart a hard-stop alert appeared prompting the provider to discuss ASD screening results with the parent of the child. Progress was tracked through chart audits, number of eligible children aged 18 months and 24 months who were screened during the 2-month period. Children with a positive score were referred to early intervention, behavioral health and audiology when needed.

Measures

The outcome measures used to assess the performance of this project included the percentage of children aged 18 months and 24 months who were screened for ASD during their well-child exam between August 2022 and December, 2022. During these 4-months, the process measure utilized included the number of missed opportunities where the provider or staff failed to address the EMR prompts during well-child exams. We tracked missed opportunities through chart audits of children aged 18 months and 24 months who were eligible for ASD screening but

were not screened. At the culmination of the 4-month period, a chart audit of all the 18 month and 24 -month well child visit was completed, and the team reflected on the barriers encountered and that prevented ASD screening from being completed. The balancing measure for this project was the percentage of visits that went over the 30-minute allotted time for the well child visit. We anticipated increased workload for providers and nursing staff at the initiation of the project because the clinic currently faces staff shortage and adding extra tasks could lead to decreased productivity. This was reflected on longer appointment times as compared to before the intervention.

Analysis

To conduct a thorough analysis, baseline data were collected prior to the implementation of the intervention. Baseline data was obtained through the review of clinical charts that matched inclusion criteria, children aged 18 month and 24 months, screening over a 2-month time span prior to intervention and 2 months post-intervention. The data was extracted from the electronic medical record and patient information was deidentified. Data was gathered from August 2022, pre-intervention period, through December 2022 post intervention. This baseline data provided a means to analyze changes in screening rates over the implementation phase and prior to intervention. All results were entered into Microsoft Excel and the data obtained was graphed.

Ethical Considerations

Participation in this project was reviewed with parents and verbal consent was obtained prior to inclusion in this project. Clinical staff and providers were informed prior to participation and involvement was voluntary. All patient information was gathered and stored confidentially and personal information was de-identified. Additionally, this quality improvement project was

submitted to the Oregon Health and Sciences University (OHSU) Institutional Review Board (IRB) and deemed not human research prior to beginning this project (see appendix C). Another important ethical consideration that was encountered was how to manage children who screened positive based on the MCHAT-R/F screening tool. The clinic does not have an established referral process and there is a lack of pediatric providers who specialize in ASD diagnosis in Umatilla County. The wait periods to see a provider who can accurately diagnose ASD is at minimum 6 months.

Results

Pre-intervention

Prior to the implementation of a standardized ASD screening tool, the overall screening rate for all ASD screening eligible children was 60%. When broken down by age group, 83% of 18-month old children were not screened, and 44% of children aged 24 months were not screened (Appendix A). Of those screened 17% produced a negative screen and 0% were showed a positive screen for ASD.

Post-intervention

Following the implementation of the M-CHAT-R/F autism screening tool, results demonstrated that for children aged 18-months only 29% of patients were not screened. Furthermore, of those screened 14% scored positive and 57% scored negative (Appendix B). For children aged 24-months, 100% were screened (Appendix B) with no patients screening positive. The overall screening rate for children aged both 18 months and 24 months was 80%.

Discussion

Summary

In conclusion, through the implementation of this quality improvement project, the goal of increasing ASD screening rates among children 18 months and 24-months by 20%, was achieved. Prior to clinic-wide use of a standardized screening tool, overall screening rates were at 60% and there was confusion regarding which screening tool to use. There was an increase from 60% to 80% in ASD screening rates among all age groups during the 2-month implementation phase. These finding are consistent with prior literature which suggest the use of standardized ASD screening tool effectively accelerates the diagnostic process and leads to expedited initiation of a personalized therapy (Sobieski et al., 2022; Wallis et al., 2020).

Limitations

In retrospect, the study intervention was not successful during the first PDSA cycle as the EMR did not support the incorporation of the M-CHAT-R/F as a prompt reminder for all ASD screening. As a result, the intervention time span was increased to 2-months from the initially accorded month interval. Another barrier was the inability to obtain screening scores directly from the EMR which placed significant time constraint on students' ability to extract and analyze the results. To obtain results, all charts of children seen during the implementation period were manually reviewed and scores extracted from eligible charts. Furthermore, the small sample size undermines the external and internal validity of this quality improvement project which reduces the generalization of the results that were obtained. Despite the positive increase in screening rates, it is important to acknowledge the lack of a robust referral process. While the number of children found to be a risk for ASD increased, the list of available referral facilities in Umatilla

County is limited and parents often found themselves with a positive screen and a long wait for formal diagnosis and medical treatment of ASD.

Conclusion

This quality improvement project aimed to increase autism screenings at 18-month and 24-month well child visits at a rural Native American Wellness Center using a standardized screening tool, the M-CHAT- R-F, and the incorporation of this tool as an EMR reminder prompt. During the first PDSA cycle, the EMR did not support the integration of the M-CHAT-R-F which lead to inconsistency in screening. Therefore, a second PDSA cycle extended the screening window to one additional month. The results showed an 80% overall ASD screening rate for 12-month and 24-month aged children.

The target intervention for this quality improvement project was the addition of a standardized screening tool into the EMR however, further interventions are needed to continue to address ASD screening rates in this population. Educational sessions where parents are presented with up to date information regarding the importance of early ASD screening, are desperately needed. Additionally, there is room to expand and improve on the referral process within Umatilla County. In a community with a long-standing history of mistrust in western medicine, healing broken connections may be necessary in order to gain full access to this underserved community.

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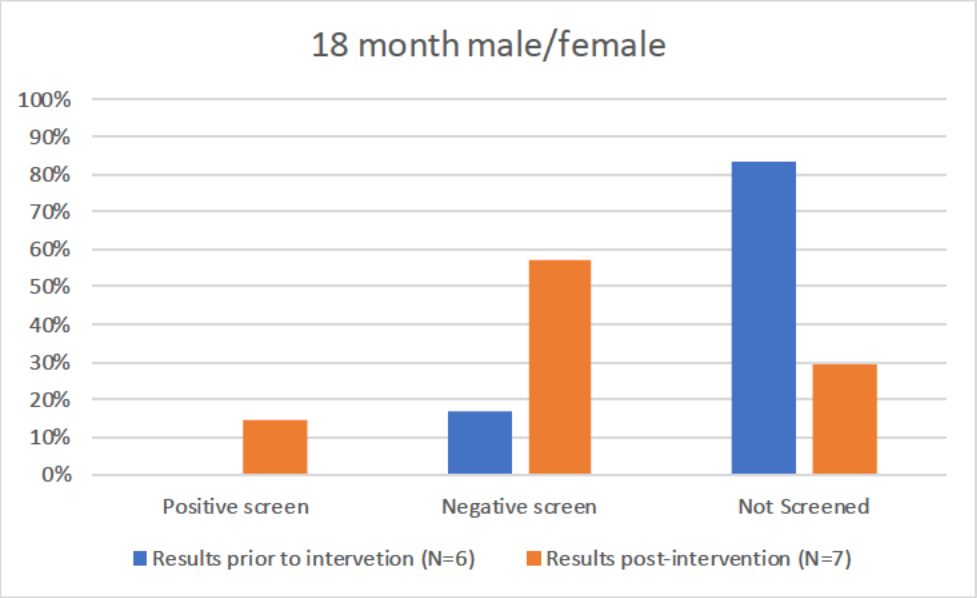
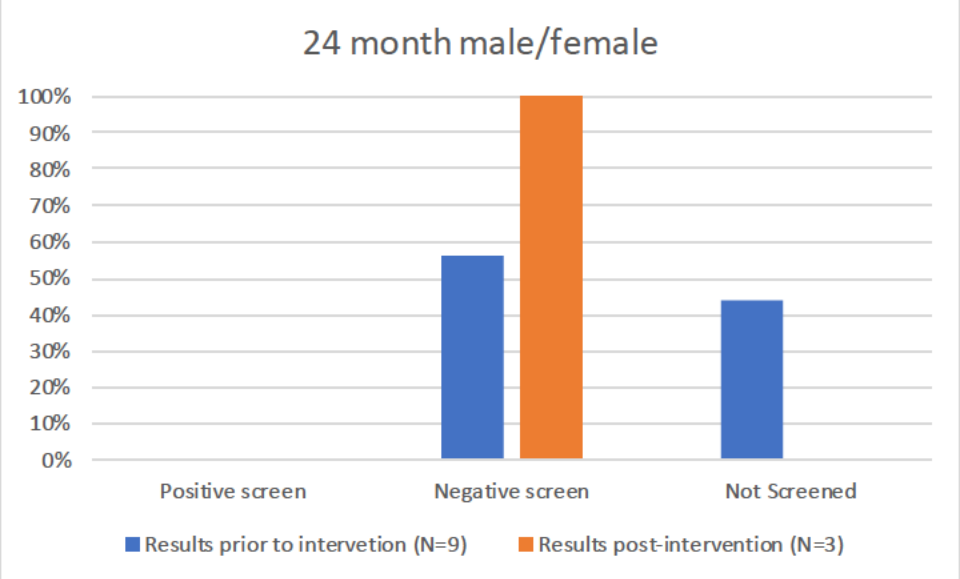
Appendix (A): Screening Percentages Pre/Post Intervention 18-month Population



Appendix (B): Screening Percentages Pre/Post Intervention 24-month Population



Appendix (C): IRB Research Approval Letter

IRB MEMO

Research Integrity Office
3181 SW Sam Jackson Park Road - L106RI
Portland, OR 97239-3098
(503)494-7887 irb@ohsu.edu

NOT HUMAN RESEARCH

September 8, 2022

Dear Investigator:

On 9/8/2022, the IRB reviewed the following submission:

Title of Study:	Increasing Autism Spectrum Disorder Screening Utilizing a Standardized Screening Tool: A Quality Improvement Project
Investigator:	Heather Wiggins
IRB ID:	STUDY00024832
Funding:	None

The IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required.

Certain changes to the research plan may affect this determination. Contact the IRB Office if your project changes and you have questions regarding the need for IRB oversight.

If this project involves the collection, use, or disclosure of Protected Health Information (PHI), you must comply with all applicable requirements under HIPAA. See the HIPAA and Research website and the Information Privacy and Security website for more information.

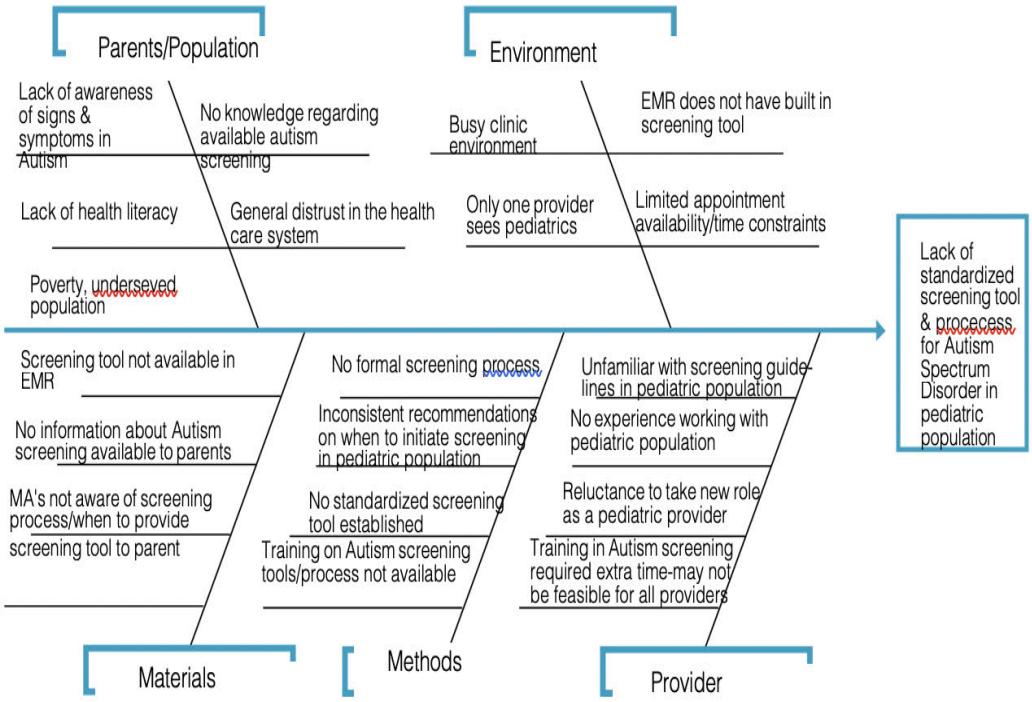
Sincerely,

The OHSU IRB Office

Appendix (D): Cause and Effect Diagram

Team: *Eva Jaime Ramos* **Project:** *Standardized Screening Tool for Autism Spectrum Disorder*

1) Input the effect you'd like to influence.
2) Input categories of causes for the effect (or keep the classic five).
3) Input causes within each category.



Appendix (E): M-CHAT-R/F Autism Screening Tool

M-CHAT-R™

Please answer these questions about your child. Keep in mind how your child usually behaves. If you have seen your child do the behavior a few times, but he or she does not usually do it, then please answer **no**. Please circle **yes** or **no** for every question. Thank you very much.

1. If you point at something across the room, does your child look at it? (**FOR EXAMPLE**, if you point at a toy or an animal, does your child look at the toy or animal?)	Yes	No
2. Have you ever wondered if your child might be deaf?	Yes	No
3. Does your child play pretend or make-believe? (**FOR EXAMPLE**, pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal?)	Yes	No
4. Does your child like climbing on things? (**FOR EXAMPLE**, furniture, playground equipment, or stairs)	Yes	No
5. Does your child make unusual finger movements near his or her eyes? (**FOR EXAMP**Superscript child wiggle his or her fingers close to his or her eyes?)	Yes	No
6. Does your child point with one finger to ask for something or to get help? (**FOR EXAMPLE**, pointing to a snack or toy that is out of reach)	Yes	No
7. Does your child point with one finger to show you something interesting? (**FOR EXAMPLE**, pointing to an airplane in the sky or a big truck in the road)	Yes	No
8. Is your child interested in other children? (**FOR EXAMPLE**, does your child watch other children, smile at them, or go to them?)	Yes	No
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (**FOR EXAMPLE**, showing you a flower, a stuffed animal, or a toy truck)	Yes	No
10. Does your child respond when you call his or her name? (**FOR EXAMPLE**, does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Yes	No
11. When you smile at your child, does he or she smile back at you?	Yes	No
12. Does your child get upset by everyday noises? (**FOR EXAMPLE**, does your child scream or cry to noise such as a vacuum cleaner or loud music?)	Yes	No
13. Does your child walk?	Yes	No
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Yes	No
15. Does your child try to copy what you do? (**FOR EXAMPLE**, wave bye-bye, clap, or make a funny noise when you do)	Yes	No
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Yes	No
17. Does your child try to get you to watch him or her? (**FOR EXAMPLE**, does your child look at you for praise, or say "look" or "watch me"?)	Yes	No
18. Does your child understand when you tell him or her to do something? (**FOR EXAMPLE**, if you don't point, can your child understand "put the book on the chair" or "bring me the blanket"?)	Yes	No
19. If something new happens, does your child look at your face to see how you feel about it? (**FOR EXAMPLE**, if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Yes	No
20. Does your child like movement activities? (**FOR EXAMPLE**, being swung or bounced on your knee)	Yes	No

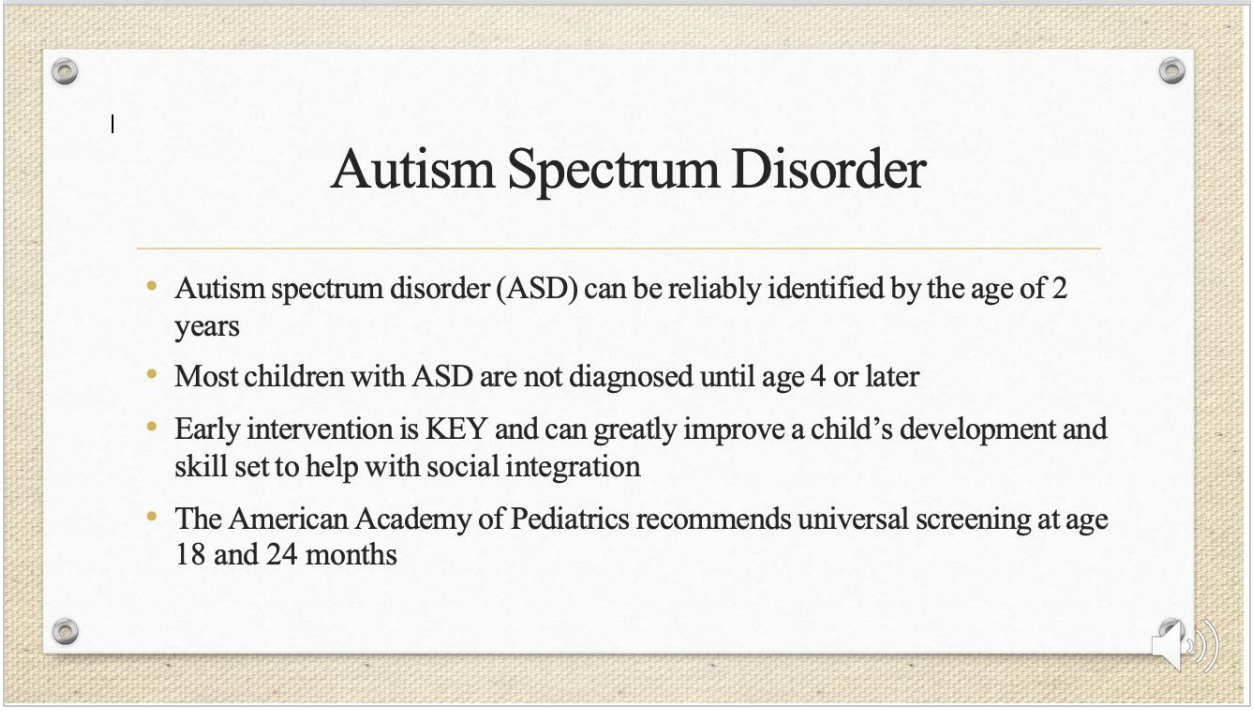
M-CHAT-R Follow-Up™ Scoring Sheet

Please note: Yes/No has been replaced with Pass/Fail

1. If you point at something across the room, does your child look at it? (**FOR EXAMPLE**, if you point at a toy or an animal, does your child look at the toy or animal?)	Pass	Fail
2. Have you ever wondered if your child might be deaf?	Pass	Fail
3. Does your child play pretend or make-believe? (**FOR EXAMPLE**, pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal)	Pass	Fail
4. Does your child like climbing on things? (**FOR EXAMPLE**, furniture, playground equipment, or stairs)	Pass	Fail
5. Does your child make unusual finger movements near his or her eyes? (**FOR EXAMPLE**, does your child wiggle his or her fingers close to his or her eyes?)	Pass	Fail
6. Does your child point with one finger to ask for something or to get help? (**FOR EXAMPLE**, pointing to a snack or toy that is out of reach)	Pass	Fail
7. Does your child point with one finger to show you something interesting? (**FOR EXAMPLE**, pointing to an airplane in the sky or a big truck in the road)	Pass	Fail
8. Is your child interested in other children? (**FOR EXAMPLE**, does your child watch other children, smile at them, or go to them?)	Pass	Fail
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (**FOR EXAMPLE**, showing you a flower, a stuffed animal, or a toy truck)	Pass	Fail
10. Does your child respond when you call his or her name? (**FOR EXAMPLE**, does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Pass	Fail
11. When you smile at your child, does he or she smile back at you?	Pass	Fail
12. Does your child get upset by everyday noises? (**FOR EXAMPLE**, a vacuum cleaner or loud music)	Pass	Fail
13. Does your child walk?	Pass	Fail
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Pass	Fail
15. Does your child try to copy what you do? (**FOR EXAMPLE**, wave bye-bye, clap, or make a funny noise when you do)	Pass	Fail
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Pass	Fail
17. Does your child try to get you to watch him or her? (**FOR EXAMPLE**, does your child look at you for praise, or say "look" or "watch me")	Pass	Fail
18. Does your child understand when you tell him or her to do something? (**FOR EXAMPLE**, if you don't point, can your child understand "put the book on the chair" or "bring me the blanket")	Pass	Fail
19. If something new happens, does your child look at your face to see how you feel about it? (**FOR EXAMPLE**, if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Pass	Fail
20. Does your child like movement activities? (**FOR EXAMPLE**, being swung or bounced on your knee)	Pass	Fail

Total Score: _____

Appendix (F): Staff/Provider Educational M-CHAT-R/F Screening Presentation

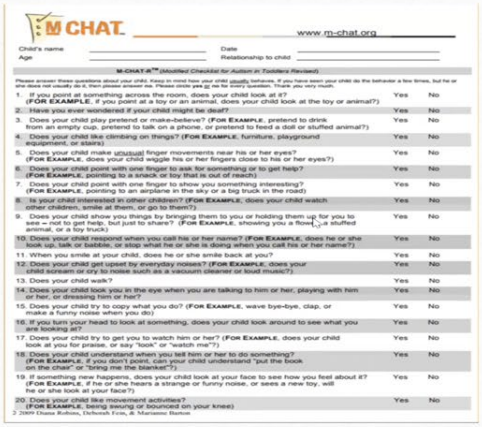


What is M-CHAT-R/F?

- A 2-stage parent-report screening tool designed to assess risk for autism spectrum disorder (ASD).
- May be administered and scored as part of a well-child visit. Primary goal is to maximize sensitivity by detecting as many cases of ASD as possible.
  - M-CHAT-R is a 20 item caregiver-report questionnaire
  - M-CHAT-R Follow-Up is a follow up interview
  - Designed for use in children between 16 and 30 months of age

How to score M-CHAT R/F

- Step 1: Have a caregiver complete the M-CHAT-R
  - Each questionnaire consists of 20 yes/no questions
- Step 2: Score the questionnaire
  - For items 2, 5, and 12, "Yes" indicates ASD risk
  - For all other items, "No" indicates ASD risk
- Step 3: Follow-up interview for items that indicate ASD risk using M-CHAT-R-Follow-up interview
  - Use M-CHAT- R/F to ask caregivers each item indicating ASD risk
  - Mark each item as pass or fail, depending on response
- Step 4: Share results with family
  - Scores 0-2 indicate low risk for ASD
  - Scores 3-7 indicate medium risk
  - Scores 8-20 indicate high risk



M-CHAT www.m-chat.org

Child's name _____ Date _____

Age _____ Relationship to child _____

M-CHAT-R™ (Modified Checklist for Autism in Toddlers Revised)

Please answer these questions about your child. Keep in mind how your child usually behaves. If you have seen your child do the behavior a few times, but he or she does not usually do it, then please answer no. Please circle yes or no for every question. Thank you very much.

1. If you point at something across the room, does your child look at it? (FOR EXAMPLE, if you point at a toy or an animal, does your child look at the toy or animal?)	Yes	No
2. Have you ever wondered if your child might be deaf?	Yes	No
3. Does your child play pretend or make-believe? (FOR EXAMPLE, pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal?)	Yes	No
4. Does your child like climbing on things? (FOR EXAMPLE, furniture, playground equipment, or stairs)	Yes	No
5. Does your child make unusual finger movements near his or her eyes? (FOR EXAMPLE, does your child wiggle his or her fingers close to his or her eyes?)	Yes	No
6. Does your child point with one finger to ask for something or to get help? (FOR EXAMPLE, pointing to a snack or toy that is out of reach)	Yes	No
7. Does your child point with one finger to show you something interesting? (FOR EXAMPLE, pointing to an airplane in the sky or a big truck in the road)	Yes	No
8. Is your child interested in other children? (FOR EXAMPLE, does your child watch other children, smile at them, or go to them?)	Yes	No
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (FOR EXAMPLE, showing you a flower, a stuffed animal, or a toy truck)	Yes	No
10. Does your child respond when you call his or her name? (FOR EXAMPLE, does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Yes	No
11. When you smile at your child, does he or she smile back at you?	Yes	No
12. Does your child get upset by everyday noises? (FOR EXAMPLE, does your child scream or cry to noise such as a vacuum cleaner or loud music?)	Yes	No
13. Does your child walk?	Yes	No
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Yes	No
15. Does your child try to copy what you do? (FOR EXAMPLE, wave bye-bye, clap, or make a funny noise when you do)	Yes	No
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Yes	No
17. Does your child try to get you to watch him or her? (FOR EXAMPLE, does your child look at you for praise, or say "look" or "watch me"?)	Yes	No
18. Does your child understand when you tell him or her to do something? (FOR EXAMPLE, if you don't point, can your child understand "put the book on the chair" or "bring me the blanket"?)	Yes	No
19. If something new happens, does your child look at your face to see how you feel about it? (FOR EXAMPLE, if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Yes	No
20. Does your child like movement activities? (FOR EXAMPLE, being swung or bounced on your knee)	Yes	No

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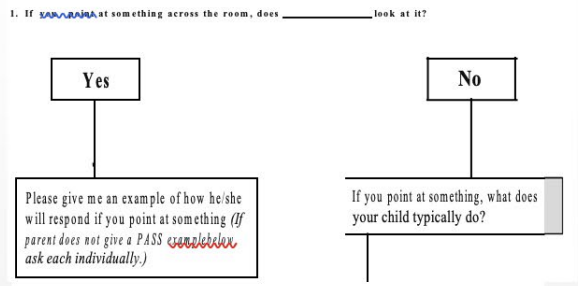
How score the questionnaire

- For items 2, 5 and 12, "Yes" indicates ASD risk
- For all other items, "No" indicates ASD risk
- Add up items indicating ASD risk
- If score is between 0-2 or 8-20, skip step 3 and go straight to step 4

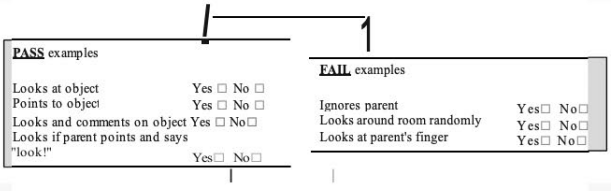
Follow-up interview

- Follow up with each item indicating ASD risk from the M-CHAT-R using the flow chart for that item
- Continue asking questions until you have a clear pass or fail
- If parents respond "maybe" ask them whether it is most often Yes or NO

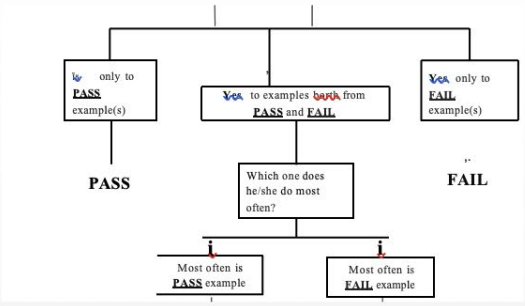
Example: Follow-up interview



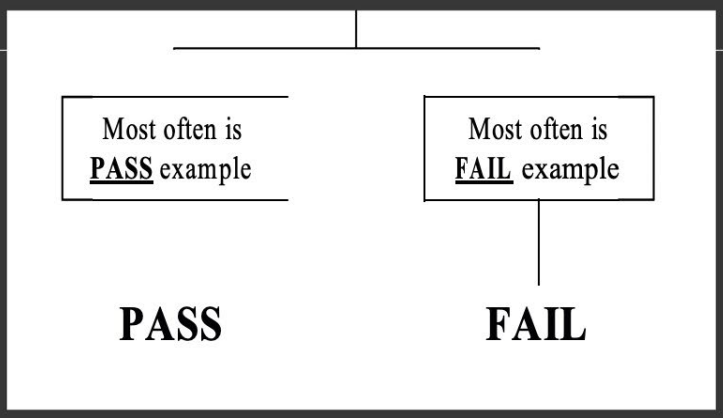
Example Follow-up interview



Example Follow-up interview



Example: Follow-up interview



Thank You!

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