Early Developmental Screening, a perspective from Kaiser Permanente

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Objectives

Inform	Share	Review	Update	Distribute
Prevalence of developmental conditions	Developmental screening tools	EDSP process and next steps	Physicians about screening results that reveal developmental challenges and predict autism. Outline next best steps The evaluation conducted by a Speech Therapist. And next steps.	Distribute resources to help with screening and treatment.

DISCLOSURE INFORMATION: Dr Salvato

- I was a general pediatrician from 1989-2003.
  - I remain board certified in Pediatrics as well as Developmental and Behavioral Pediatrics.
- I was the Medical Director for all the Regional Early Intervention Centers in Maine.
- I owned and operated a preschool and indoor playground for 15 years.
- I have 3 neurotypical adult children and 2 neurodiverse adult children.
- I still think like a child.
- I believe that early intervention really makes a difference and that all of you are in the best position to put theory into practice.
- I believe everyone is equal and should have equal opportunities
- But I recognize that we live in a society where that remains an unmet dream.

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Epidemiology

- Prevalence
- Learning Disabilities
    - 9.7%
    - Increased odd's ratio with lower parental education, LES, being male, adopted, separate parent households, presence of a smoker
        - Pediatrics, Altarac 2007
    - Black and Latino youth overrepresented.
    - ASQ clue- Problem Solve Fail
- PTSD/TSD, preschoolers
    - 7-20%
    - depends on study and if use age-appropriate criteria

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Epidemiology

- ADHD - 9.4%
    - Boys 13.2%
    - Girls 5.6%
- Disruptive Behavior Disorders – 7.4%
- Anxiety Disorders – 7.1%
- FASD – 3-5%
- Autism – 3%
- Depression – 3.2%
    - CDC, 2020

Social-Emotional Development

- COVID 19 pandemic and its impact
  - Retrospective cohort study, 60,171 families , full term children, screened at 12m and 18m using ASQ and ASQ-SE (did not have COVID as a disease)
    - National Nurse visiting program
  - Odds ratio for positive screening in the pandemic cohort compared to pre-pandemic cohort
    - ASQ SE, at 12m OR 1.35 cohort 1, OR 1.94 cohort 3
    - ASQ SE, at 18m OR 1.61 cohort 2, OR 1.87 cohort 3
    - COM, at 18m OR 1.39 cohort 2, OR 1.28 cohort 3
      - Socioemotional Development during COVID-19 Pandemic, JAMA Pediatrics 2023.

Cognitive and Emotional Well Being

- COVID-19 and its impact
- Cross sectional study, 2 age cohorts, (2018-2022)
  - 718 @ 24m of which 258 were studied pre-pandemic, 460 during pandemic
  - 703 @ 54m of which 417 studied pre-pandemic and 286 during pandemic
  - Used ASQ, MCHATR @24m, NIH Toolbox @ 54m
    - Ontario Canada
- Mixed results
  - Pandemic exposed children, better problem solving, OR 2.48
  - Pandemic exposed children, higher risk social emotional, OR 1.67
    - Cognitive and Emotional Well Being Preschool Children, JAMA Open Network 2023.

Risk for Developmental Delay Infants

- COVID-19 and its impact on infants born during pandemic.
- Two longitudinal cohorts, pre-pandemic, 2903 children born, 2015-2018 vs 3742 born during pandemic, 2020-2021
- ASQ @1 year of age
    - Canada
- Higher OR for delay on COM, GM and PS
        - Risk for Developmental Delay among infants born during COVID-19 Pandemic, Journal Developmental Behavioral Peds 2023.
- Meta analysis, studies evaluating neurodevelopmental outcomes infants born during pandemic and those exposed to maternal COVID illness
    - 8 studies, 21,419 infants, 11438 screened during pandemic, 700 +maternal infection, 9981 pre-pandemic
        - International
    - Of those screened during pandemic, higher risk COM delay OR 1.70 and PS delay OR 1.55
    - + Maternal SARS-CoV2 infection, higher risk FM delay (only) OR 3.46
        - JAMA Open Network 2022.

Electronic Media and Developmental Delay

- Prospective cohort study, 2441 children, screened @24m, 36m and 60m with ASQ. 2011-2016, parent report screen time, mean of 17hr/wk @24m, 25hr/wk @36m, 11hr/wk @60m of electronic media.
  - Calgary/Alberta Canada
  - 77.8% white, 66% high income, 58.4% college
  - Multivariate regression, controlling for these factors and depression, reading to child, etc. still yielded a significant correlation.
- Higher levels of screen time associated with more fails on ASQ
    - Association Between Screen Time and Children's Performance on a Developmental Screening Test | Child Development | JAMA Pediatrics | JAMA Network, 2019,Madigan.

Electronic Media and Developmental Delay

- Prospective cohort study of 57,980 children, screened using ASQ @ 12m, 24m and 36m, excluded children with a DD. Parent report screen time, range <1hr/d to >4hr/d.
  - Japan
  - 23.7% college, 57.65% high income
  - Random-intercepts, Cross-Lagged Panel and Multivariate regression, controlling for depression, reading to a child, still yielded a significant relationship.
    - More screen time at younger ages, persisted
    - Screen time associated with more COM Fail at 24m
    - Screen time associated with more FM and PS Fails at 36m
      - Screen Time and Developmental Performance Among Children at 1-3 Years of Age in the Japan Environment and Children's Study | Global Health | JAMA Pediatrics | JAMA Network, 2023, Yamamoto.

Technoference

- More screen time, fewer conversations with caregivers
  - New York times March 2024
- Australia
- Prospective cohort, 220 families, children 12m → 36m
  - Language Environment Analysis, sampled; adult words, child vocalizations, conversational turns
  - Adjusted for maternal education, # children in home, # activities, caregiver stress
  - Average screen time 1.5 hrs @12m → 3 hrs @ 36m
- Each additional minute of screen time @36m associated with:
  - 6.6 less adult words directed to child
  - 4.9 less child vocalizations
  - 1.1 less conversational turns
    - JAMA Pediatric MR 2024, Brushe.

Parental Adverse Childhood Experiences

- Increased risk of developmental delays.
  - Unique study in that it looked at impact of maternal and paternal ACEs
  - Retrospective cohort, 311 mother-child dyads, 122 father-child dyads, 2m→24m
  - Suburban Oregon
  - ASQ
  - Multivariate regression
  - For each additional ACE there was an 18% risk for DD.
  - Pediatrics 2018, Folger.

TABLE 3 Domain-Specific Developmental Risk (<1 SD Below Mean) by Maternal ACE Exposure

	Maternal ACEs		RR (95% CI)
	≥1 (*n* = 149), *n* (%)	<1 (*n* = 162), *n* (%)	
Communication	24 (16.3)	18 (11.1)	1.47 (0.83–2.60)
Gross motor	20 (13.5)	17 (10.6)	1.28 (0.70–2.35)
Fine motor	18 (12.1)	16 (9.9)	1.22 (0.65–2.31)
Problem solving	17 (11.6)	8 (5.0)	2.31 (1.03–5.20)**
Personal-social	19 (12.9)	17 (10.6)	1.22 (0.66–2.26)
	≥2 (*n* = 60), *n* (%)	<2 (*n* = 251), *n* (%)	
Communication	12 (20.3)	30 (12.0)	1.69 (0.92–3.11)*
Gross motor	12 (20.0)	25 (10.0)	1.99 (1.06–3.73)**
Fine motor	9 (15.0)	25 (10.0)	1.51 (0.74–3.06)
Problem solving	11 (18.3)	14 (5.7)	3.23 (1.55–6.76)***
Personal-social	9 (15.0)	27 (10.9)	1.38 (0.68–2.77)
	≥3 (*n* = 39), *n* (%)	<3 (*n* = 272), *n* (%)	
Communication	10 (26.3)	32 (11.8)	2.23 (1.19–4.16)**
Gross motor	9 (23.1)	28 (10.4)	2.23 (1.14–4.36)**
Fine motor	8 (20.5)	26 (9.6)	2.15 (1.05–4.40)**
Problem solving	6 (15.4)	19 (7.1)	2.17 (0.92–5.10)*
Personal-social	8 (20.5)	28 (10.4)	1.97 (0.97–4.01)*

There were *n* = 2, *n* = 2, *n* = 4, and *n* = 3 records missing domain-specific scores for communication, gross motor, problem solving, and personal-social, respectively.

* $P < .1$;

** $P < .05$;

*** $P < .01$.

Childhood ACEs and Kindergarten Outcomes

- Prospective longitudinal study, 5000 children
  - Report out 1007 children who had data from their Kindergarten teacher
- Urban New Jersey, single parents
- Academic skill questionnaire, CBCL-teacher
- Adjusting for confounders, children who experienced >=3 ACEs were:
  - 1.8 X more likely to have below average language, reading and math skills
  - 3.5 X more likely to have attention problems
  - 2.7 X more likely to have social problems
  - 2.3 X more likely to have aggressive behavior
    - Pediatrics FEB 2016, Jimenez

American Academy of Pediatrics

- About 16% of children under 6 years have clinically significant mental health problems that require clinical care early in life.
- Most present with dysregulated emotional or behavioral patterns including anger, aggression, or anxiety that interfere with a child's ability to participate in family and community activities.
- These problems rarely resolve spontaneously without intervention but often respond to therapy and family support.
  - https://www.aap.org/en/patient-care/mental-health-minute/mental-health-in-infants-and-young-children/
- What about other disorders?
  - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4496484/

What to do?

- Search
- See
- Screen
- Seek help
- Screening support (DSS)
- Specialty support (PDV, ST, OT, PT, PhD, PSY)
- Service support (PDDO)

Poll Question

- Developmental Surveillance is the same as Developmental Screening?
  - True or False?

TEXT: specialcareservices301 to 22333 to join session. Then Type TRUE or FALSE

Developmental Surveillance is the same as Developmental Screening?

(TRUE) TRUE

0%

(FALSE) FALSE

0%

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

2 Poll Questions

At what age(s)should a child have developmental screening performed?

- 9m, 18m, 30m
- 9m, 12m, 18m
- 12m, 18m, 24m

What about screening for autism?

- 18m, 24m
- 24m, 36m

At what age(s) should a child have developmental screening performed?

9, 18, and 30 months

0%

9, 12, and 18 months

0%

12,18, and 24 months

0%

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

At what age(s) should a child be screened for autism?

18 and 24 months

0%

24 and 36 months

0%

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

TPMG-Screening tools

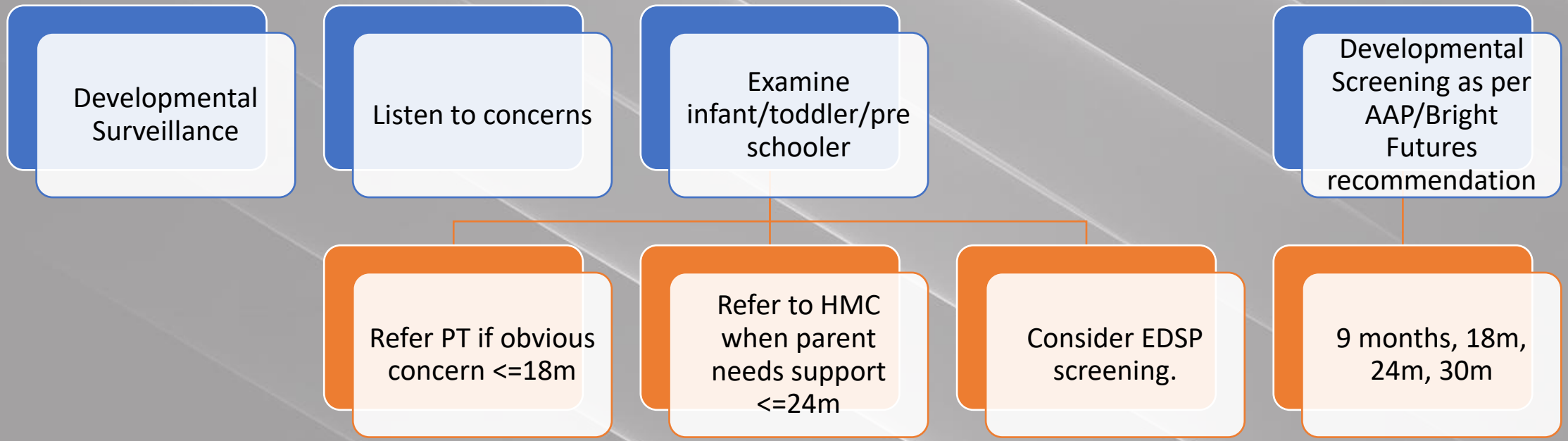
Primary level

- Survey of Well-being of Young Children (SWYC)
- Social Determinants of Health (SDH)
- Adverse Childhood Experiences (ACES)
- Parent Health Questionnaire-2 (PHQ2)
- MCHAT/MCHATR
- Clinician surveillance
- Measurements, HC, HT, WT
- Labs, Hct, Hg, Lead, Ferritin

Secondary level

- ASQ/MCHATR
  - Developmental screening specialist (DSS) review and MCHATR verify
- ASQ/CAST
  - Developmental screening specialist review (CAST>15)

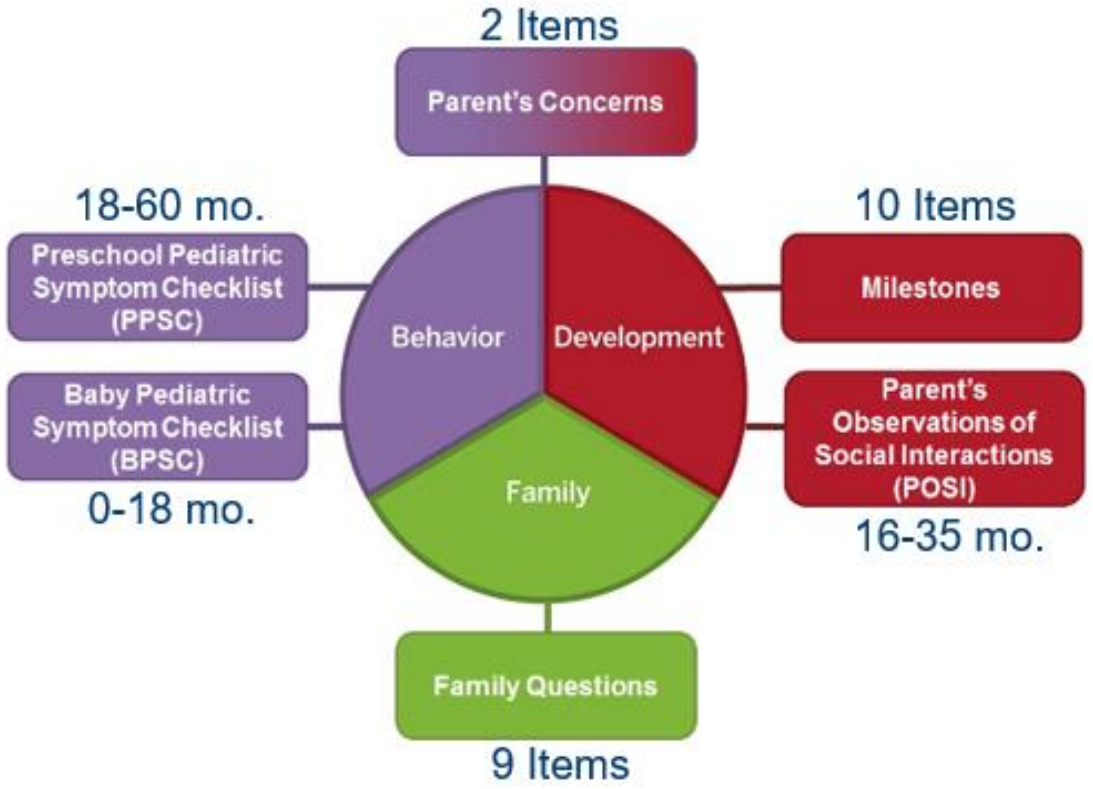
The role of the PCP?



Review of the Survey of Well-being of Young Children (SWYC)

- Current WCC developmental questions are components of the SWYC
- Components
- Scoring
  - Electronic

FORM	Age (m)	Needs Review	Appears to meet age expectations
2m	1-3	No Milestones cut scores available	
4m	4	≤13	≥14
	5	≤15	≥16
6m	6	≤11	≥12
	7	≤14	≥15
	8	≤16	≥17
9m	9	≤11	≥12
	10	≤13	≥14
	11	≤14	≥15
12m	12	≤12	≥13
	13	≤13	≥14
	14	≤14	≥15



SWYC

Milestones: 9 months

9 months, 0 days to 11 months, 31 days

V1.08, 9/1/19

Child's Name:

Birth Date:

Today's Date:

MILESTONES

Most children at this age will be able to do some (but not all) of the developmental tasks listed below. Please tell us how much your child is doing each of these things. PLEASE BE SURE TO ANSWER ALL THE QUESTIONS.

	Not Yet	Somewhat	Very Much
Holds up arms to be picked up	0	1	2
Gets into a sitting position by him or herself	0	1	2
Picks up food and eats it	0	1	2
Pulls up to standing	0	1	2
Plays games like "peek-a-boo" or "pat-a-cake"	0	1	2
Calls you "mama" or "dada" or similar name	0	1	2
Looks around when you say things like "Where's your bottle?" or "Where's your blanket?"	0	1	2
Copies sounds that you make	0	1	2
Walks across a room without help	0	1	2
Follows directions - like "Come here" or "Give me the ball"	0	1	2

Tufts Children's Hospital

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Survey of Wellbeing of Young Children

The SWYC includes brief questionnaires to assess three domains of child functioning:

Developmental Domain

- Two questionnaires are included:
- All parents complete a Developmental Milestones checklist containing 10 questions about their child's motor, language, social and cognitive development. Age-specific forms are available for each pediatric well child visit.
- Parents of children between 16 and 35 months of age also complete the Parent's Observations of Social Interactions (POSI), an autism-specific screener checklist of 7 key questions from the MCHAT.

Emotional/Behavioral Domain

- Parents complete one of two age-specific behavioral questionnaires, developed as downward extensions of the well- validated and popular Pediatric Symptom Checklist (PSC):
- The Baby Pediatric Symptom Checklist (BPSC) for children up to 18 months (12 items)
- The Preschool Pediatric Symptom Checklist (PPSC) for children 18-60 months (18 items)
- Parents are also asked whether they have any concerns about their child's behavior, learning, or development (2 items)

Family Context

- Parents complete a set of screening questions addressing aspects of the child's family context (9 items)
  - https://www.tuftsmedicine.org/sites/default/files/2023-10/SWYC%20Manual%20v101%20Web%20Format%2033016.pdf Complete manual , authors Dr Perrin and Dr Sheldrick

Survey of Wellbeing of Young Children

- **Cost**
- Free
- **Literacy Level**
- Can be administered by a health care professional if caregiver has low literacy
- **Key Reference Link**
- https://www.floatinghospital.org/The-Survey-of-Wellbeing-of-Young-Children/Publications-Invited-Talks-and-Presentations.aspx
- **Limitations**
- Further validation still needed; some reports of high number of false positives
- **AAP Publication References**
- "Promoting Optimal Development: Screening for Behavioral and Emotional Problems (2015) http://pediatrics.aappublications.org/content/early/2015/01/20/peds.2014-3716"
- **Number of Items**
- 10-17
- **Language**
- English, Spanish, Portuguese, Burmese, Yoruba
- Validity and Reliability
  - Adequate specificity and sensitivity
  - JAMA, 2020

Research Articles on SWYC

- PPSC
  - The Preschool Pediatric Symptom Checklist (PPSC): Development and initial validation of a new social/emotional screening instrument - PMC (nih.gov)
- BPSC
  - The Baby Pediatric Symptom Checklist: Development and Initial Validation of a New Social/Emotional Screening Instrument for Very Young Children - PMC (nih.gov)
- POSI
  - Sensitivity and Specificity of 2 Autism Screeners Among Referred Children Between 16 and 48 Months of Age - PubMed (nih.gov)

Screening Tools Comparison

https://agesandstages.com/wp-content/uploads/2019/01/ASQ-Comparison-Chart-2018.pdf

https://pubmed.ncbi.nlm.nih.gov/36804771/

Tool	ASQ	PEDS:DM	SWYC	MCHATR
Single stage screener?	Yes	Yes	Yes	Yes
Areas screened	COM, GM,FM, Problem-Solving, Personal-Social	EXP, REC,FM, GM, SE, Self-Help	Cognitive, language, motor, behavior, social-emotional interaction	Social communication
Time to complete	10-15 minutes, score 2-3 minutes (now autoscore)	3 minutes, 2 minutes to score	15 minutes, scored 1-2 minutes (autoscore capable)	5 minutes, score 1 minute, (now autoscore) Verify takes 10-12 minutes
Sensitivity/Specificity	86%/85%	74-80%/70-80%	DM 76%/77% POSI 93.6%/40.8%	83%/94% (verified)
Languages	English, Spanish, Arabic, Chinese, French, Vietnamese	English, Spanish	English, Spanish, Khmer, Burmese, Nepali, Portuguese, Haitian-Creole, Arabic	Multiple, KP library English, Spanish
Cost	Contractual (for KP) and unit based	Contractual (for KP) and unit based	Free	Free

Early Developmental Screening Program

KAISER PERMANENTE®

- Mission
  - To assist primary care physicians by screening children at risk for developmental delays and signs of autism and to triage them to appropriate resources.
- Team includes
  - Developmental Screening Specialists (DSS), currently 20, 8 more to be onboarded 2024
    - Unique in the nation approach
    - Provide secondary level screening
  - Administrative Support Coordinators, 8
  - Administrative Support Manager, 1
  - Behavioral Medicine Management Director III
  - Behavioral Medicine Management Director II, 2

Early Developmental Screening Program Process, The How

Each well visit will have SWYC embedded at some point, which will trigger a 2nd step screening-→ ASQ

Enter under orders: EDSP

This triggers a PSM to family and if needed a letter to access the ASQ online

- If obvious hypotonia, motor delay refer to PT and or Neurology as needed, asap.

Families can complete screening in the comfort of their home with props/toys they may have access too.

Scored automatically by Brooks Publishing which is linked to the EDSP database.

The EDSP DSS reviews screening results, parent comments and your notes/comments, chart, tests. Cases are reviewed by the Medical Director.

Referrals placed on behalf of PCP, developmental activities and resources given to parents

Depending on findings, rescreening often recommended using AAP/Bright Futures guidelines

Screening Concerns

Below in Personal Social <18m

- Potential causes
  - Maternal depression
  - Limited opportunities
  - Stressful environment
  - Language delays
  - Electronic media-cell phone exposure
  - Social-communication delay aka autism.
  - If EDSP screens @ 9m and notes PS fail, we will Rx screen at 16m since we can use MCHATR

Below in Communication and Personal Social, 16m -66m

- Even with Low Risk MCHATR 0-2
  - Higher likelihood of autism > 1/3 diagnosed with ASD by 6 years of age

Screening Concerns

MCHATR/F (note the F which means followed-up or verified by a DSS)

- **Total Score 0-2: Low Risk,** no need to do verify but we often do, if parent or PCP concerns or COM/PS fail
- **Total Score 3-7: Moderate Risk,** we verify and then refer to ASD, or PDV based on age, walking, parental preference, DSS judgement
- **Total Score >8: High Risk,** no need to verify, refer for autism evaluation

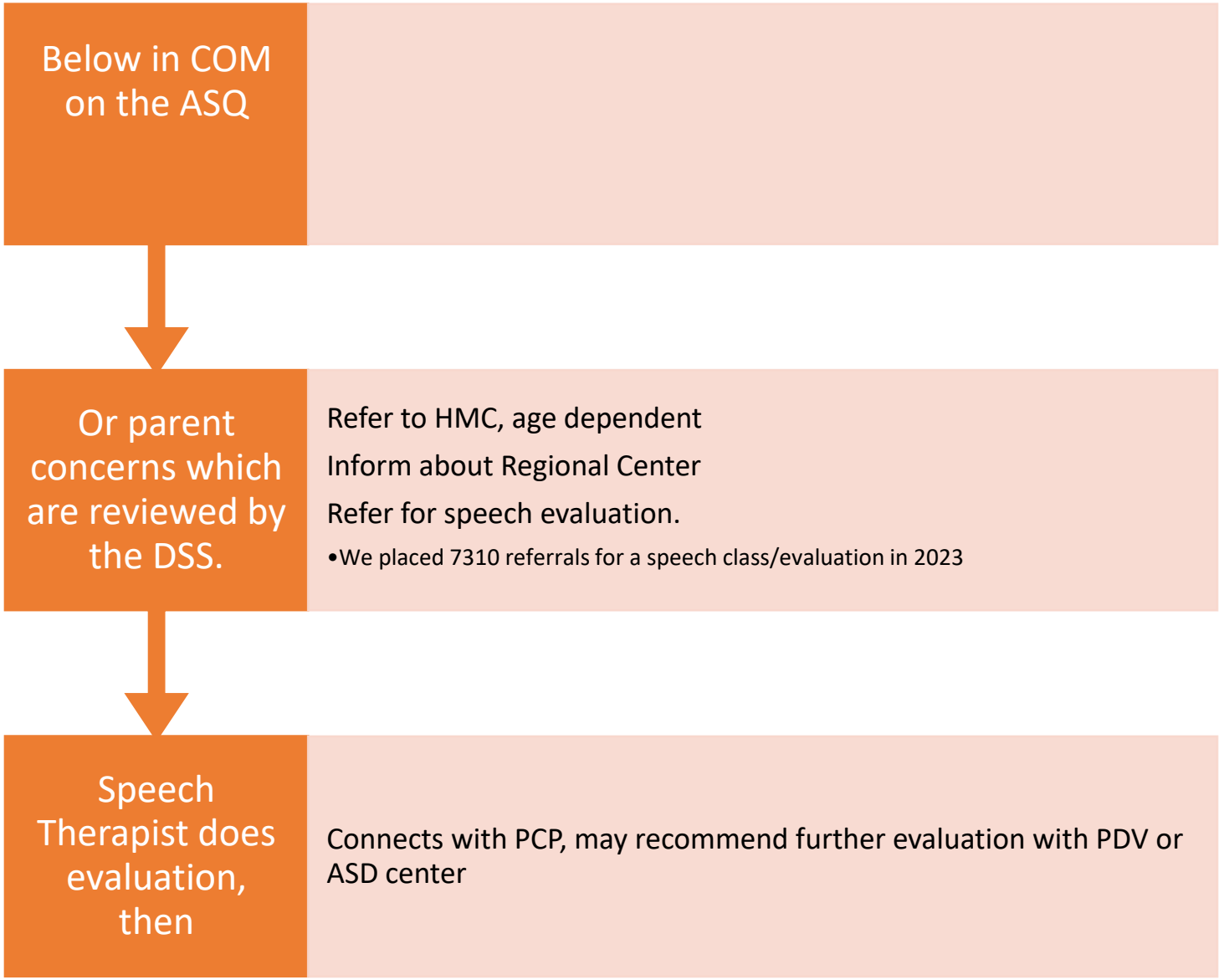
POSI score cut off of concern >=3

- **18m and score >6**, high likelihood ASD, *(PPV, 55%, DOR personal communication)*
- **24m and score >5**, high likelihood ASD, *(PPV 65-75%, DOR personal communication)*
- POSI score 0 or 1, highly unlikely to have ASD or DD, (NPV >98%, personal communication Dr Sheldrick)

Screening Concerns

- What happens after screening?
  - It is time for someone to assess.
  - A DSS refers to PDV when 2 or more fails on the ASQ, low risk MCHATR. Or to ASD center if moderate or high risk MCHATR and/or parental concerns
    - In 2023
      - We placed 2085 referrals to PDV
      - We placed 3398 referrals to the ASD center
    - We place a referral to ST, Audiology as needed, OT as needed.
    - Provide information for Early Start Regional Center <3 yo
    - School District >= 3yo
    - Once screened and evaluated no longer gets screened by EDSP (as child has been assessed, identified and is no longer at risk.)
  - The PDV expert steps in……..

Screening Concerns



EDSP refers to a ST

- What happens after screening?
  - A DSS refers to ST for an evaluation.
    - May place referral to:
      - Audiology, age dependent and any flags of concerns.
      - OT if FM fail
    - Provides information for:
      - Early Start Regional Center <3 yo
      - Autism Navigator site if parental concern but negative screen
      - School District >= 3yo
    - Once screened and evaluated no longer gets screened by EDSP (as child has been identified and is no longer at risk.)
  - The Speech Therapy expert steps in……..

After ST evaluation:

- ST may have specific concerns and then reach out to the PCP who will need to place a referral for the following:
  - Picky Eating Class (Oakland Pedi-OT, confirmed ASD diagnosis)
  - Sensory processing parent coaching class (Oakland Pedi-OT, confirmed ASD diagnosis)
  - Help Me Communicate (<30m)
  - ASD Evaluation (the ST reviews signs and mentions the possibility to the parent)
  - Feeding evaluation
  - Physical Therapy evaluation

EDSP Tools and Resources

- **Ages and Stages**
  ASQ-3 Age Calculator
  http://agesandstages.com/age-calculator
- **Center for Disease Control and Prevention**
  Developmental Milestones: 2 months – 5 years
  www.cdc.gov/ncbddd/actearly/milestones/index.html
- **Birth to 5: Watch Me Thrive!**
  http://www.acf.hhs.gov/programs/ecd/child-health-development/watch-me-thrive
- **Healthy Children.org**
  - https://www.healthychildren.org/English/MotorDelay/Pages/default.aspx
  - Identify areas of concern with activities
- **EDSP/ASQ**
  - We have activity handouts for child age and area of concern.

EDSP Tools and Resources

- Regarding early childhood development:
  - https://www.zerotothree.org/
  - https://www.cde.ca.gov/sp/cd/re/parentresources.asp
  - https://csefel.vanderbilt.edu/resources/family.html
  - https://youtu.be/N1lh708afjA
    - Learn the Signs, Act Early
- **Enhance social communication, mitigate ASD symptoms**:
  - An Early Start to Social Interaction Training: www.helpisinyourhands.org
  - A good book to help kids connect, communicate and learn: An Early Start for a Child with Autism by Sally Rogers PhD.
  - Autism Navigator
    - Parents register, video footage showing signs and offers ways to intervene
      - 16 gestures by 16 months
      - www.autismnavigator.com

Other Resources

- Warm Line Family Resource Center, CA
  - Founded by parents, provides guidance/support
    - http://www.warmlinefrc.org/
- Regional Centers
    - North Bay-Napa/Solano 800-646-3268, Sonoma, 707-755-5113
    - East Bay 510-618-6195
    - Alta California 916-978-6249
    - Valley Mountain- San Joaquin/Stockton,209-955-3281, Stanislaus/Modesto, 209-557-5619
    - Central Valley-Fresno, 559-276-4480, Merced, 209-723-2944
    - Golden Gate 888-339-3305
    - San Andreas- Santa Clara/Santa Cruz, 844-700-9889, Monterey, 831-443-1279
- Learning Disabilities Association
    - https://ldaamerica.org/
- Attitude
  - Magazine geared towards parents with children who have ADHD
    - https://www.additudemag.com
- Child Mind Institute
    - https://childmind.org/topics/disorders/learning-and-development-disorders/
- National Center for Learning Disabilities
  - https://www.ncld.org/
    - Nice review with UTD information
      - https://www.ncld.org/wp-content/uploads/2014/11/2014-State-of-LD.pdf

Disclaimer

- The recommendations in this slide set do not indicate an exclusive course of treatment or serve as the only standard of medical care. Variations, considering individual circumstances, may be appropriate.

    - *A life spent making mistakes is not only more honorable, but more useful, than a life spent doing nothing. George Bernard Shaw*