Objectives

- Review basic developmental principles
- Describe principles of surveillance and screening with emphasis on AAP policy
- Discuss screening tools and implementing them into practice
- Interpret results of developmental screening

Why is it important?

- I have no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider of commercial services discussed in this CME activity.

Why early identification?

- Pattern of delayed or deviant development
  - Within one stream signals increased risk in other streams
  - Directs evaluation (developmental & medical/etiologic)
  - Directs the type and intensity of early intervention services
- Early intervention helps prevent or reduce secondary problems

How are we doing?

- Current detection rates actually lower than prevalence
  - Better for disorders of lower prevalence but higher severity
  - Worse for disorders of higher prevalence but lower severity
- Variety of techniques currently in use
  - Developmental milestones (checklist)
  - Clinical judgment (gestalt) – used by 71% (Sand 2005)
  - Standardized screening tools – used by 15-20% routinely (Sand 2005)
What should we be using?

- How to best perform such early detection is unknown
- Find out what works for you and your practice for screening to go smoothly
  - When is it best to administer during the visit?
  - Who will distribute, collect and/or score?
  - Who will explain the results?
  - Who will make the referrals?

So why is it so tough?

- Development is dynamic, highly variable
- Developmental surveillance takes time
- Pitfalls:
  - Waiting until a problem is observed ("wait and see")
  - Dismissing or ignoring screening results
  - Relying on informal methods
  - Confusing screening with evaluation

AAP Guidelines

- Basics
- Surveillance
- Screening
- Evaluation
- Services

Domains

- Motor: gross, fine
- Self-help (adaptive)
- Problem-solving (cognitive)
- Social-emotional
- Language: receptive, expressive, pragmatic, speech

Symptoms

- Delay
- Deviancy
- Dissociation
- Regression

One measurement is not helpful. (Apply similar "principles" as growth.)
Developmental Quotients
- Rate of acquisition of milestones
- Developmental age ÷ chronological age x 100
- Think “velocity”
- Helps to know how far is too far, how far behind is the child

<table>
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<th>DQ&gt;85</th>
<th>Normal</th>
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<td>Concerning</td>
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<td>DQ&lt;70</td>
<td>Significant delay</td>
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Delay
- Definition: pattern of developmental milestones acquired in correct sequence but at later age
- Think:
  - Delayed velocity
  - “Symptom”

Delay
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- Think:
  - Delayed velocity
  - “Symptom”

Dissociation
- Definition: differing rates of development (DQs) between domains

<table>
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<th>GM</th>
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<td>Language disorder</td>
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</table>
Deviancy
- Definition: skills attained out of sequence within a domain
  - Not always abnormal
    - Walking before crawling
  - Some always abnormal
    - Rolling ≤ 3 months old
    - Rolling supine to prone before prone to supine
    - Pulling to stand before sitting unsupported
    - Expressive > receptive language
    - Splinter (“savant”) skills

Regression
- Definition:
  - Plateau in acquisition of new skills, or
  - Loss of previously attained skills
  - Pathological until proven otherwise

Language Development
- Pre-speech period (0 to 10 months)
  - Localizing sounds is the earliest step in receptive language
  - Cooing is one of the earliest steps in expressive language
  - Attentive to adult conversations at 4-5 months
  - Non-specific babbling at 6 months
  - Adults assist development of specific babbling by reinforcing babbling (as if it had meaning)

Language
- Language delays most common
  - Difficult to assess by observation in a well-child visit
    - History will be particularly important
  - Language is one aspect of communication
    - Non-verbal: facial expressions, gestures, sign language, written
    - Speech is the production of sound, not language
    - Communicative intent is just as important

Regression
- Etiologic DDX:
  - Neurodegenerative disorders: Tay Sachs, ALD, etc
  - Genetic: Rett Syndrome
  - Metabolic: amino acid disorders, OTC deficiency, etc

Language Development
- Naming period (10-18 months)
  - Realization of names and labels
  - 1st word (other than mama and dada) at 12 months old
  - Understands 100 words by 12 months old
  - Immature jargoning by 13 months old
  - Mature jargoning by 15 months old
  - Speaks 25 words by 18 months old
  - Pointing is just as important
Language Development

- **Word Combination Period (18-24 months)**
  - Giant words at 18 months old ("All gone", "Stop that", "I want")
  - Holophrases at 20 months old ("Mommy?" while pointing to keys)
  - 2-word sentences (noun + verb) at 24 months old, usually by 50-word vocabulary
  - 3-word sentences and pronouns at 36 months old, usually has 300 words

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AAP Algorithm

1. Visit
2. Perform Surveillance
3. Does surveillance identify risks?
4. If yes, administer screening tool
5. Screen positive/concerning? Then:
   - Visit
   - Perform Surveillance

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Surveillance

- “A flexible, longitudinal, continuous and cumulative process whereby knowledgeable health care professionals identify children who may have developmental problems” (AAP, 2006)
- Components:
  - Parental concerns
  - Developmental history
  - Informed observations of the child’s development
  - Risk and protective factors
  - Screening

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Eliciting Parents’ Appraisals

- **Concerns** – accurate predictors of problems
  - “Please tell me any concerns about the way your child is behaving, learning and developing.”
- **Estimations** – correlated well with DQs
  - “Compared to others, how old would you say your child acts?”
- **Predictions** – reflects parents’ estimate, useful for anticipatory guidance

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Eliciting Parents’ Descriptions

- **Recall**
  - Notoriously unreliable
  - Reflects prior conceptions of children’s development
  - Accuracy improved by records, diaries (e.g., baby book)
  - Even if accurate, age of milestone is of limited predictive value
Eliciting Parents’ Descriptions

- **Report**
  - Importance of question format
  - Identification: “What words does your child say?”
  - Recognition: “Does your child use any of the following words?”
  - Usually produces higher estimates than through directly eliciting
  - Child within a familiar environment (home)
  - Skills inconsistently demonstrated

Risk & Protective Factors

- **Risk Factors**
  - Demographic, genetic, biological, social, environmental factors
  - Multiple risk factors are cumulative
  - Protective factors contribute to resiliency
  - Adds dimension to interpretation of screening results
  - Often modifies screening and surveillance process

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Background Basics Surveillance Screening Evaluation Services

Developmental Surveillance & Screening

**AAP Algorithm**

- Yes: Does surveillance identify risk?
  - Screen positive/concerning?
  - Administer screening tool
  - Yes: Administer screening tool
  - No: Is this the 9, 18 or 30 month visit?
  - Yes: Administer screening tool
  - No: Screen positive/concerning?

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Screening

- “The administration of a brief standardized tool aiding the identification of children at risk of a developmental disorder” (AAP 2006)
  - Applied to asymptomatic children to identify problems
  - Applied to children identified to be at risk, with concerns
  - “Sorting” strategy to find children who probably have difficulties from those who probably do not
  - General screen at 9, 18 and 24 or 30 month visits (AAP 2006)
  - Autism-specific screen at 18 and 24 month visits (AAP 2007)

Key Qualities of Screening Tools

- Sensitivity: accuracy of test in identifying delayed development (true positives)
- Specificity: accuracy of test in identifying individuals who are not delayed (true negatives)
- Reliability: ability to produce consistent results (intertest, intratest, test-retest)
- Validity: ability to discriminate a child at a determined level of risk for delay from the rest of the population
Key Qualities of Screening Tools

- Culturally sensitive
- Sensitivity and specificity of 70-80%, reliability of 80% are acceptable for developmental screening
- Will result in 20-30% false positive identification or over-referral (e.g., children with below average skills, high psychosocial risks)

Screening Methods

- Clinician-administered versus parent questionnaire
  - Meets same level of sensitivity, specificity at correctly identifying children with delay
  - Parental concern not influenced significantly by parent education, income, socioeconomic factors (Glasoe 1997, 1998)
- General versus domain-specific
  - Ideally, a general screening measure should be followed by a domain-specific one to narrow scope

Screening Tools: General

- Ages & Stages Questionnaire (ASQ)
- Batelle Developmental Inventory Screening Tool (BDI-ST)
- Bayley Infant Neurodevelopmental Screen (BINS)
- Brigance Screens-II
- Child Development Inventory (CDI)
- Denver-II Developmental Screening Test
- Parents' Evaluation of Developmental Screen (PEDS)

Screening Tools: Specific

- Language & Cognitive
  - Capute Scales (Cognitive Adaptive Test/Clinical Linguistic Auditory Milestone Scale [CAT/CLAMS])
  - Early Language Milestone (ELM) Scale
- Autism Spectrum Disorders
  - Checklist for Autism in Toddlers
  - Modified Checklist for Autism in Toddlers
  - Pervasive Developmental Disorders Screening Tool-II (PDDST-II)

FYI, there are many others...

- Ex. Emotional/behavioral:
  - Pediatric Symptom Checklist (parent & youth report) and Pictorial Pediatrics Symptom Checklist

M-CHAT

- Fails screen if fails ≥ 2 critical items or ≥ any 3 items
- Critical items look for joint attention
- False positives due to other developmental disorders

*See AAP 2006 for detailed description.*
Results of Screening

- When screening results are concerning:
  - Schedule developmental evaluations
  - Schedule medical evaluations
- Screening administered due to concerns but results normal:
  - Schedule early return visit for additional surveillance
- Screening administered routinely and results are normal:
  - Inform parents, continue with preventative visit
  - Take the opportunity to focus on developmental promotion

Tips on learning 2 languages

- Practice is needed, just like for any other skill
- Use 2 languages from the start
  - Ex. Parents speak only Spanish if both are Spanish-proficient
  - Ex. Spanish-proficient parent speaks Spanish only, while English-proficient parent speaks English only
- Give opportunities to hear and practice both languages daily

Bilingual Language Development

- Fluency is not the same as from proficiency
- Language milestones are the same as for monolingual-exposed child
  - Ex: For vocabulary, add up the absolute number of words

Bilingual Language Development

- Monolingualism is the exception, not the rule
- Bilingualism is one type of multilingualism
- Types of bilingualism
  - Simultaneous bilingualism: both languages may be blended or mixed, which is normal and not “confusion”
  - Sequential bilingualism: learning the second language after starting the first may cause a “silent period” for a few months, which is normal

Documenting results

- Specifically document actions taken or planned
- Share your opinions and concerns with relevant professionals

Explaining abnormal results

- Use language that encourages follow-up
- Avoid negative and meaningless words
- Be sensitive to cultural meaning of words

Results of Screening

- Screening administered due to concerns but results normal:
  - Schedule early return visit for additional surveillance
- Screening administered routinely and results are normal:
  - Inform parents, continue with preventative visit
  - Take the opportunity to focus on developmental promotion
Tips on learning 2 languages

- Use many forms to teach language
  - Books
  - Audiotapes and CDs
  - Videos and DVDs (better for concepts > language)
  - Language camps & educational programs
- Reassure parents that learning 2 languages will not cause speech or language problems, however
- Language disordered children will need help

Background
Basics
Surveillance
Screening
Evaluation
Services

AAP Algorithm

Does surveillance show risk? Yes No

Administer screening tool

Screening positive/concerning? Yes No

Refer for evaluation and services

Schedule early return visit

Is this the 9, 18 or 30 month visit? Yes No

Administer screening tool

Screening positive/concerning? Yes No

Schedule next routine visit

Refer for evaluation and services

Referrals

- Evaluations
  - Developmental evaluation to determine status
  - Medical evaluation to determine etiology
- Services
  - Early Childhood Intervention if <3 years old
  - Early Childhood Special Education if >3 years old

Developmental Evaluation

- “Aimed at identifying the specific developmental disorder or disorders affecting the child” (AAP 2006)
  - Completed in children who have concerns on surveillance, do not pass screening
  - Involves an in depth, comprehensive diagnostic examination of relevant domains
  - Provides further prognostic information, specific appropriate therapeutic interventions
Developmental Evaluation

- Who would best do this depends on your DDX
  - Neurodevelopmental pediatrician
  - Developmental-behavioral pediatrician
  - Child neurologist
  - Child psychiatrist
  - Child psychologist
  - Early childhood professionals (e.g., ECIs)
  - Allied health therapists: speech-language, physical, occupational

Medical Evaluation

- Aimed at determining underlying etiology
- Takes into consideration biological, environmental, other risks
- Includes:
  - Vision screening/evaluation
  - Hearing screening/evaluation
  - Review of newborn metabolic screening, growth charts
  - Update of environmental, medical, family and social history
  - Specific testing as indicated (imaging, EEG, genetic, etc) in conjunction with subspecialist

Standardized Quotients

- Standardized quotients (or scores) often are reported with mean = 100 and SD = 15

Ex. Intellectual Quotients

- Intellectual disability: Borderline (-1.5 to -2SD), Mild (-2 to -3SD), Moderate (-3 to -4SD), Severe (-4 to -5SD), Profound (<-5SD)

Ex. Language Quotients

- Language disorders: (lower threshold) Mild (-1.5 to -2.0 SD), moderate (-2 to -2.5SD), severe (-2.5 to -3SD)

Language Disorders

- Strong familial component, especially first degree relatives
- High concordance rate in twin studies
- Categorized descriptively
  - Language disorders: expressive, receptive and expressive
  - Speech disorders: articulation disorder, dysfluency, voice disorders
Management
- If a disorder is not identified, schedule earlier return visits for close surveillance
- If a disorder is identified, initiate chronic-condition management
  - By underlying etiology (e.g., Trisomy 21)
  - By developmental disorder (e.g., cerebral palsy, intellectual disability, autism spectrum disorders, language disorders)

Early Childhood Intervention
- Can be initiated even before developmental, medical evaluations complete
- Works because development is malleable, affected by the environment
- Offers
  - Developmental evaluation
  - Services in a natural setting: developmental service, therapies, service coordination, social work services, assistance with transportation, parent/family training, behavioral counseling

Early Childhood Intervention
- Teaches mothers to interact, communicate better
- Provides information on child development
- Provides appropriate expectations, general social support
- Enhances the child's intellectual, language and social competence
- Removes external risk factors
- Places children in developmentally enriched settings
- Trains parents in responsiveness and effectiveness
- Optimizes the ability of families to meet child's special needs
- Provides continuous positive redirection and focused building skills

Prognosis
- Variable but predictable based on severity

Prognosis
- In language disorders
  - How long does it take to improve?
  - Is more intense services better?
  - What else can we expect?
Final Remarks

- Development is dynamic, variable
- Surveillance and screening is important
- Listening to parents is valuable
- Screening tools can and do help our children
- Administer a screening tool if there are concerns or risk factors identified on usual surveillance and at the 9, 18 and 24 or 30 months (even if asymptomatic)

Screening sorts children into 3 categories:

- Not passed: needs additional evaluation
- Passed with risks: needs close monitoring/surveillance
- Passed with no risks: needs usual monitoring

Pattern of screening results will guide referrals

When referring for a developmental evaluation, forward results of surveillance and screening and your concerns

Questions?

References