Genetic Considerations in Young Children with Developmental Delays

- The webinar will begin at (1:30 PM CST).
- There will be minimal audio before the webinar begins.
- Please run the audio setup wizard to make sure your speakers work.
  - You will not need to test your microphone! (Skip microphone setup)
Today’s Presenters

Kruti Acharya, MD
Assistant Professor
Director, Illinois LEND
University of Illinois Chicago

Dorelia Rivera
Parent
Director of Blue Cross Blue Shield/Healthcare Service Corporation
Today’s Moderators

Maria Matticks
Consultant
Early Intervention Training Program

Michaelene M. Ostrosky
Head and Goldstick Family Scholar,
Special Education, University of Illinois

Alissa Jones
Research Specialist
Early Intervention Training Program
Survey & Certificate

This webinar has ILLINOIS EI credit as well as ILLINOIS STATE LICENSURE* credit

*OT, PT, SLP, SW, Nutrition/Dietitian

Look for “unique” email AFTER the webinar with the survey from Early Intervention Training Program (eitraining@illinois.edu)

If you joined as a group, each individual will need to complete the unique survey for credit
Chat

Move the column

Rollover the top or right side border to resize the chat box.

type in this box—lower left side of screen
Who do we have participating with us today?

A. Parent/caregiver
B. Early Interventionist
C. CFC Staff
D. Administrators
E. Other (list in Chat Room)
Genetic Considerations in Young Children with Developmental Delay.

Krutí Acharya, MD
Dorelia Rivera
EITP webinar
March 2, 2016
Disclosure

Neither presenter has any financial or commercial relationships to disclose
Learning objectives

Identify red flags of genetic disorders that providers might observe during evaluations with children

Review current genetic screening and testing technologies

Access resources for screening, referral for further testing and counseling,

Employ strategies for communicating with and supporting families and for coordinating care with specialists
What is genetics? What are genes?

Body’s instruction manual

DNA

Mutations
• no effect
• cause new variations
• cause disease
What is genetics? What are genes?

Body's instruction manual

DNA

Mutations
- no effect
- cause new variations
- cause disease
How common are genetic diseases?

- 10,000 single-gene genetic disorders identified
- 30% pediatric hospitalizations are due to a genetic disease
- 2.5 million Illinois residents are affected by a genetic disorder
Recognizing Clinical Red Flags
Family health history
Family health history
SCREEN mnemonic for family history

SC—Some Concerns. “Do you have any concerns about diseases or conditions that run in the family?”
SCREEN mnemonic for family history

**SC—Some Concerns.** “Do you have any concerns about diseases or conditions that run in the family?”

**R—Reproduction.** “Have there been any problems with pregnancy, infertility, or birth defects in your family?”

Trotter, Martin 2007
SCREEN mnemonic for family history

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**E—Early disease,** death, or disability. “Have any members of your family died or become sick at an early age?”

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**E—Ethnicity.** “How would you describe your ethnicity?” or “Where were your parents born?”

Trotter, Martin 2007
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E—Early disease, death, or disability. “Have any members of your family died or become sick at an early age?”

E—Ethnicity. “How would you describe your ethnicity?” or “Where were your parents born?”

N—Nongenetic. “Are there any other risk factors or nonmedical conditions that run in your family?”

Trotter, Martin 2007
Rule of too/two

TOO
- TOO tall
- TOO short
- TOO early
- TOO many
- TOO young
- TOO different

TWO
- TWO tumors
- TWO generations
- TWO in the family
- TWO birth defects

Chen, Saul 2013
Developmental red flags

- Global developmental delay
- Intellectual disability
- Autism Spectrum Disorder
  - Fragile X?
- Hearing loss
Physical red flags

- Dysmorphic features
- Unusual growth patterns
- Skin findings
Kayla’s Story: Symptoms

- **Rash**
- Fever
- Joint pain
- Periodic fevers
- **Conjunctivitis**
- Headaches
- **Seizures**
Types of genetic screening and testing
<table>
<thead>
<tr>
<th>Screening Tests</th>
<th>Diagnostic Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testing done on a specified population</td>
<td>Testing done on specified individuals</td>
</tr>
<tr>
<td>Individuals are asymptomatic</td>
<td>Individuals may be symptomatic</td>
</tr>
<tr>
<td>Not designed to diagnose, simply to identify</td>
<td>Individuals may have had a positive screening test</td>
</tr>
<tr>
<td>individuals at higher risk</td>
<td></td>
</tr>
<tr>
<td>May lead to diagnostic tests</td>
<td>May lead to treatment options</td>
</tr>
</tbody>
</table>
Poll: Have you or someone in your immediate family had any kind of genetic testing?

- Yes
- No
Newborn Period
Newborn screening

- Screening leads to early intervention to prevent morbidity and mortality
- Positive results require confirmation
Illinois Newborn screening

- Screens 29 conditions
- Some genetic and some not genetic
Case: Newborn screening

Photo Credit: http://www.todaysparent.com
What to say about abnormal newborn screening result?

- Formal consent not obtained, so parents maybe unsure of screening goals and process
- Confirmatory testing required
What to say about abnormal newborn screening result?

Formal consent not obtained, so parents maybe unsure of screening goals and process

Confirmatory testing required

Newborn screening does not screen for every known mutation

Continued reassurance and support whether confirmatory testing positive or negative
Case: Genetic diagnosis at birth

Photo credit: www.bahymed.org
What percentage of parents of children with Down Syndrome are dissatisfied with the experience of receiving their child’s diagnosis?

A. 10%
B. 25%
C. 50%
D. 90%
How to deliver news postnataally?

- Language matters
- Be positive and calm
- Congratulate on birth of baby
- Avoid language expressing pity or sorrow
- Be sensitive and empathic

BG Skotko et al, Pediatrics. 2009
How to deliver news postnatally?

- Ask about parent’s familiarity, knowledge and experience with condition
- Do not overwhelm with information
- Address fears

BG Skotko et al, Pediatrics. 2009
What should we talk about once diagnosis confirmed?

Parents and professionals prioritize different information

Parents value information about abilities and potential

Childhood Genetic Testing
Childhood genetic testing

Targeted testing when child has red flags or symptoms according to published guidelines (autism, intellectual disabilities)

JB Moeschler, Pediatrics, 2014
Childhood genetic testing

Targeted testing when child has red flags or symptoms according to published guidelines (autism, intellectual disabilities)

Cascade testing/pedigree analysis of affected proband

JB Moeschler, Pediatrics, 2014
Reasons for genetic testing

- Co-management of patients in medical home
- Clarification of etiology
- Prognosis/Expected clinical course
- Access to research treatment protocols
- Recurrence risks
- Condition-specific family support
- Refined treatment options
- Symptom management and surveillance for known problems
- Avoidance of unnecessary or redundant tests

JB Moeschler, Pediatrics, 2014
Which genetic test is not routinely used?

A. Karyotype
B. Fluorescence In Situ Hybridization
C. Chromosomal Microarray
D. Whole Exome Sequencing
Types of cytogenetic tests

**KARYOTYPE**

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**FISH**

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https://www.mun.ca

http://www.mayomedicallaboratories.com
Chromosomal Microarray

- Chromosomal microarray
  - Detect duplications, deletions and copy number variations
  - Does not detect specific gene mutations
  - No information about structural nature or sequencing
  - Results: abnormal, variant of uncertain significance, likely benign
## Types of Cytogenetic Tests

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Karyotype</th>
<th>FISH Image</th>
<th>Microarray</th>
<th>DNA Sequencing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detects large deletions or duplications</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Detects deletions or duplications in part of a chromosome</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Detects small deletions or duplications</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Detects translocations</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detects sequence changes and single gene mutations</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

http://www.geneticsinprimarycare.org
Kayla’s Story: Diagnosis

• NOMID
  • neonatal-onset multisystem inflammatory disease
• Most causes genetic
• Rare- Only 100 known cases world-wide
Communicating with Families around Childhood Testing
Barriers to effective communication

- Low genetic literacy and numeracy
- Lack of provider knowledge
- Limited access to genetic counseling
- Cultural considerations
- Expectation gap
- Genetic determinism

Pre-test counseling = informed consent

- **Benefits**
- **Risks**
- **Alternatives** → No testing
Benefits

May reveal cause

Possible testing outcomes (abnormal, uncertain, likely benign)
Benefits

May reveal cause
- Possible testing outcomes (abnormal, uncertain, likely benign)

May inform prognosis
- Variability in genetic expression
- Not always 1:1 Correlation between Genotype and Phenotype
Risks

Reveals information about parents

- Misattributed paternity
- Carrier status

Incidental findings

Risk of discrimination
Fearing Punishment for Bad Genes

By KIRA PEIKOFF   APRIL 7, 2014
Genetic Information Nondiscrimination Act (GINA) of 2008 protects against all types of insurance discrimination

A. True
B. False
Genetic Information Nondiscrimination Act (GINA) of 2008

- Protects against health insurance discrimination
- Protects against employment discrimination

Genetic Information Nondiscrimination Act (GINA) of 2008

- Protects against health insurance discrimination
- Protects against employment discrimination
- Does not protect against other types of insurance discrimination (i.e. life, disability and long-term care)

Affordable Care Act of 2010 (ACA)

People with genetic conditions
- Cannot be denied coverage
- Cannot be charged higher premiums
Post-test counseling

- Review limits of test
  - What results can tell us
  - What we don’t yet know
  - If uncertain, discuss need for parental testing
Post-test counseling

- Review limits of test
  - What results can tell us
  - What we don’t yet know
  - If uncertain, discuss need for parental testing
- Resources
- Connect to support groups
- Referral to genetic specialist
- Follow-up
Kayla’s Story

Dear Ms. Rivera,
It was great to see you at the White House on Friday. As promised, here’s the photo of me speaking with the President in the Oval Office about precision medicine a few months ago. The photo I am showing him is Kayla. Warm regards to you and your famous daughter!
Francis Collins
Supporting Families and Coordinating Care
Genetics Services Map

- Local Public Health Departments
- Clinical Genetic Centers

http://www.idph.state.il.us/HealthWellness/genetics_map.htm
Resources for Families

Genetic Alliance: http://www.geneticalliance.org/


National Organization for Rare Disorders: http://rarediseases.org/
Kayla’s Story: Treatment

https://www.youtube.com/watch?v=BYleJBDNcpo
Kayla’s Story: Moving Forward

- Peers
- Her own voice
- When and how to explain
- School life
- My work life
Conclusion
Conclusion

- Prepare families for visit from a genetic specialist
- How we communicate with families frames their experience
- Communicate uncertainty
Conclusion

Written resources and support group referrals

Follow-up critical
Thank you!

Questions: acharyak@uic.edu
           Dorelia.rivera@gmail.com

Illinois LEND Program: Illinoislend.org
Thank you for your participation!
Survey & Certificate

You will receive email with survey from Early Intervention Training Program (eitraining@illinois.edu)

Must complete unique survey to get certificate

Certificate will be emailed after survey completion (within 24 hours)

Issues with survey or certificate, please contact us at eitraining@illinois.edu
Thank you for supporting the children and families of Illinois!

Let’s Keep in Touch!

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EITP.education.illinois.edu

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The Early Intervention Training Program at the University of Illinois

The Children’s Research Center

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