Ethical Issues in Genetic Testing and Screening of Children

Luis Rohena, MD
Chief, Medical Genetics
San Antonio Military Medical Center
Assistant Professor of Pediatrics
USUHS & UTHSCSA
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Disclosure

- No Relevant Financial Relationships with Commercial Interests. Nothing to disclose.

Agenda

- When to perform genetic testing in children
- Ethical dilemmas encountered testing children
- Review commonly encountered problems: Case-based
- Review AAP and ACMG policy statements on testing in children

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Genetic Testing

• Benefits
  • Clarify and confirm a diagnosis
  • Medical management
  • Understand recurrence risks
  • Reproductive issues
    • Prenatal diagnosis/adoptive/IVF/PGD/ Donor egg or sperm

Genetic Testing

• Risks
  • Anxiety
  • Change in self image/family dynamics
  • Discrimination – employment, insurance

The risks may not be immediate or obvious

“T’m afraid we found annoying personality markers in your DNA. I can’t hire you.”

• Informed consent
• Discussion about possibilities for result
  • Positive, negative, variant of unclear significance
  • Implications for management

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- Genetic screening of minors is relatively common.
- Every year approximately 4 million infants in the United States undergo newborn screening for metabolic, hematologic, and endocrine disorders for which early treatment may prevent or reduce morbidity or mortality.

3 principles in newborn screening
- Clear benefit to the child
- System in place for confirmation of diagnosis
- Treatment and follow-up must be available for affected newborns

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Informed consent for newborn screening

- An effort should be made to educate couples about newborn screening prior to delivery
- Should screening be optional or mandatory?
  - Those that argue it should be mandatory state that the child’s welfare is more important than the parental choice.

Besides the Newborn Screening Program, genetic testing of children is less commonly performed.
- Diagnostic testing may be performed on a child with signs or symptoms of a potential genetic condition or for treatment decisions.
- Genetic testing may also be performed on an asymptomatic child with a positive family history for a specific genetic condition.

Case #1

- 29 year old male with known diagnosis of familial adenomatous polyposis (FAP) confirmed with DNA studies accompanies his 10 year old daughter to appointment with pediatrician.
  - Requests genetic testing for daughter

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Case #2
- A 10 year old boy presents with unsteady gait and tremors. Features suggestive of Friedreich’s ataxia.

FDRA review
- Associated with a slowly progressive ataxia
- Mean onset of symptoms occurs between 10-15 years of age.
- Associated with dysarthria, muscle weakness, lower limb spasticity and absent reflexes, scoliosis, bladder dysfunction, cardiomyopathy, diabetes mellitus
- Autosomal recessive
- Usually wheelchair bound by 18 years
- Treatment is generally symptomatic

Do we say YES to the TEST?
- YES
  - Already showing features
  - Will clarify diagnosis

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Case #2 Continued

- Genetic testing was able to confirm a diagnosis in the patient.
- Parents request pre-symptomatic testing for the patient's younger siblings, ages 6 and 8.

Do we say YES to the TEST?

- Can the parents speak for the rights of the children
- It is generally an untreatable condition, what are the benefits of this testing?
- Can you order a test just because the parents request it?
- Are you worried that the parents will treat those that test positive differently from those that test negative?

Carrier testing

What if the parents were interested in learning the carrier status of the children, rather than predictive testing?

Ex. Tay sachs

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Carrier Testing

- Concerns about confusion regarding the difference between being an asymptomatic carrier and being affected could lead to stigma and discrimination
- Historical example includes programs for sickle cell screening in the 1970s which led to misinformation and discrimination.
- Arguments for carrier testing in children and adolescents include increase in reproductive choices
- Carriers are sometimes identified through newborn screening- but this is not the purpose of the screening

Case #3

- A 45 year old mother was recently diagnosed with breast cancer. Genetic testing found that the mother carries a BRCA 1 mutation. She brings her 8 year old daughter to the pediatrician requesting BRCA testing.

Hereditary Breast and Ovarian Cancer (HBOC) review

- Autosomal dominant
  - Risk to child is 50%
  - Risk of breast cancer is up to 85%
  - Risk of ovarian cancer is up to 40%
- Management/Screening
  - Annual mammogram and breast MRI beginning at 25 yrs
  - Transvaginal ultrasound, CA 125 annually
  - Consideration of prophylactic surgeries including mastectomy and BSO

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Do we say YES to the TEST?

NO
Result does not have implications for management during childhood
• No change in management at this time
• Risks include lack of autonomy for minor
• Possibility of insurance discrimination
• Psychosocial implication

• What if the child is 18?
or 16?
What if mom is pregnant and desires prenatal testing?

• A father comes to clinic with his children based on their mother's diagnosis of Huntington disease. He is inquiring about whether he should have his children tested.

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Huntington disease review
• (HD) is a progressive disorder of motor, cognitive, and psychiatric disturbances.
• The mean age of onset is 35 to 44 years and the median survival time is 15 to 18 years after onset.
• The only treatment is symptomatic management

HD review
• Autosomal dominant
  – Risk to child is 50%
  Lifetime risk of developing symptoms is 100%
• Treatment is symptom based and limited. There is no known medical benefit of early diagnosis.
• Multidisciplinary approach is recommended for those considering genetic testing
  > Neurology
  > Psychology
  > Genetics

Do we say YES to the TEST?
• No
• Testing is NOT done for minors at risk for HD
• Only 10-20% of adults at risk for HD opt for pre-symptomatic genetic testing.

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Case 4 continued

- What would you say about prenatal diagnosis for HD?

Additional concerns

- Genetic testing is now being offered to identify individuals at increased risk for common adult onset conditions such as hypertension, diabetes, and Alzheimer disease.
- Without clearly helpful treatments or methods of prevention, genetic testing may have more risk than benefit.

- Research suggests that many parents may be interested in having their children tested for common adult onset diseases.

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AAP and ACMG Policy Statements

- Decisions about whether to offer genetic testing and screening should be driven by the best interest of the child.
- Genetic testing is best offered in the context of genetic counseling.

Diagnostic Testing

- Should be performed in a child with symptoms of a genetic condition, the rationale for genetic testing is similar to that of other medical diagnostic evaluations.
- When performed for therapeutic purposes, pharmacogenetic testing of children is acceptable.

Newborn Screening

- The AAP and ACMG support the mandatory offering of newborn screening for all children.
- After education and counseling about the substantial benefits of newborn screening, its remote risks, and the next steps in the event of a positive screening result, parents have the option of refusing the procedure, and an informed refusal should be respected.

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Carrier Testing

- The AAP and ACMG do not support routine carrier testing in minors when such testing does not provide health benefits in childhood.
- For pregnant adolescents or for adolescents considering reproduction, genetic testing and screening should be offered as clinically indicated, and the risks and benefits should be explained clearly.

Predictive Genetic Testing

- Parents or guardians may authorize predictive testing for asymptomatic children at risk of childhood-onset conditions.
- Predictive genetic testing for adult-onset conditions generally should be deferred unless an intervention initiated in childhood may reduce morbidity or mortality.

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Disclosure

- At the time of genetic testing, parents or guardians should be encouraged to inform their child of the test results at an appropriate age.
- Parents or guardians should be advised that, under most circumstances, a request by a mature adolescent for test results should be honored.

Disclosure

- Results from genetic testing of a child may have implications for the parents and other family members.
- Health care providers should encourage patients and families to share this information and offer to help explain the results to the extended family or refer them for genetic counseling.

- Misattributed paternity, use of donor gametes, adoption, or other questions about family relationships may be uncovered “incidentally” whenever genetic testing is performed, particularly when testing multiple family members.

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SUMMARY

- The best interest of the child should guide decisions about whether a child should undergo genetic testing.
- Generally, genetic testing should be postponed in testing for adult onset conditions and carrier testing for recessive conditions.
- There is some ambiguity regarding childhood disorders for which there is no medical interventions.
- There may be some cases where testing of an adolescent is appropriate.

References:

- R. Sugalski, SAMMC

QUESTIONS?

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