Prenatal Genetic Screening

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2-3%

Of babies will be born with anomalies or differences in their development which may or may not be able to be detected prenatally

Different sources of genetic anomalies

1 Inherited Conditions in Families

Risk can be determined by parental screening (both parents)

Parents can be carriers of conditions (it is not expressing in them, but it can be passed down)

Parents can have conditions, and can pass those conditions to children

2 True anomalies: difference in genetic development

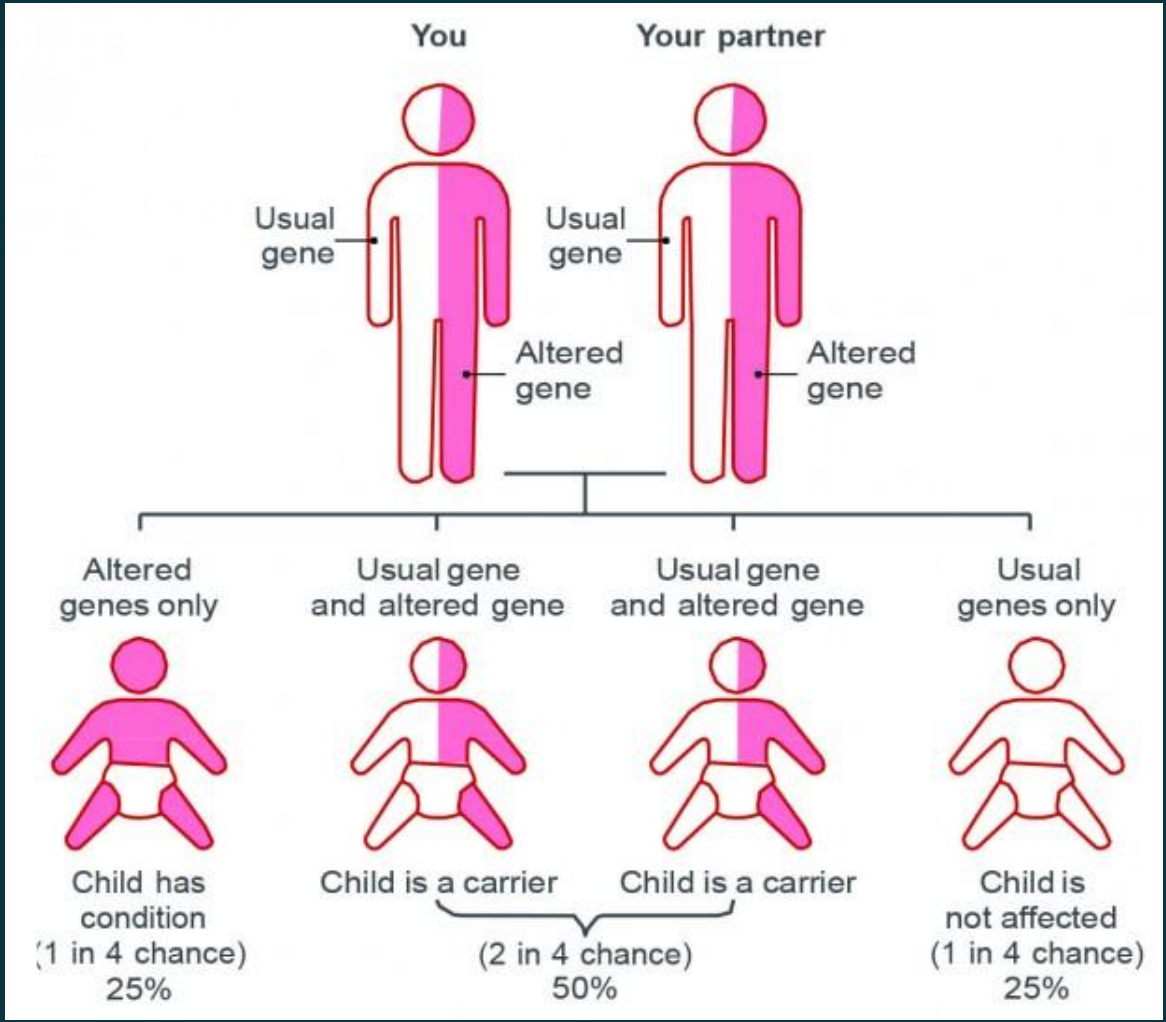
Genetic anomaly in fetal development at some junctures of cell division or replication or growth there is a deviation from “normal”.

In some cases, these deviations will produce a sequence of differences that is “not compatible with life”.

In some cases, these deviations will be relatively minor, or will allow life with differences

Inherited Conditions in Families

- Tay-Sachs Disease
- Cystic Fibrosis
- Thalassemias
- Sickle Cell Disorder
- Phenylketonuria (PKU)
- Galactosemia
- Maple syrup urine disease
- Marfan Syndrome


You
Your partner
Usual gene
Altered gene
Usual gene
Altered gene
Altered genes only
Usual gene and altered gene
Usual gene and altered gene
Usual genes only
Child has condition (1 in 4 chance) 25%
Child is a carrier
Child is a carrier
(2 in 4 chance) 50%
Child is not affected (1 in 4 chance) 25%

Inherited Conditions in Families

How do we know if a fetus is at risk?

- Test both parents for risk odds ratio
- Specialized fetal testing

How do we know if a newborn is at risk?

- Newborn metabolic/genetic screening after birth

Inherited Conditions in Families

In an OOH midwifery context, when will this actually come up?

- Client discloses condition or carrier status in health history
- Ethnic Background
- Assisted reproduction with donor sperm
- Populations with little genetic variation

True Genetic Anomalies

What we actually screen for prenatally

- Trisomy 13 (Patau Syndrome)
- Trisomy 18 (Edward's Syndrome)
- Trisomy 21 (Down's Syndrome)
- Smith-Lemli-Opitz Syndrome (SLOS)
- Neural Tube Defects and Spina Bifida

True Genetic Anomalies

How do we know if a fetus is at risk?

- Prenatal Screening Tests
- Prenatal Diagnostic Tests

How do we know if a newborn is at risk?

- Newborn Exam
- Specialized genetic screening as needed

True Genetic Anomalies

In an OOH midwifery context, when will this actually come up?

- Screening offered to all clients in pregnancy

Prenatal Testing

1 Prenatal Screening Tests

Initial screening tests, variations on sensitivity/specificity (false positive/negative)

If screening is positive, offer diagnostic testing

Generally considered non-invasive, usually involve parental bloodwork, sometimes ultrasound

2 Prenatal Diagnostic Tests

Considered 99-100% accurate

Generally considered invasive, requires direct fetal sampling

NIPT is used as both a screen and a diagnostic.

Prenatal Screening Tests

First Trimester Screening

- *Typically a state-funded program, sometimes insurance funded, sometimes no funding*
- Typically done at 11-13 weeks
- Typically involves bloodwork and ultrasound; correlated
- Looking at development, chromosome disorders

Prenatal Screening Tests

Second Trimester Screening

- *Typically a state-funded program, sometimes insurance funded, sometimes no funding*
- Could be a followup to 1st tri screening, or standalone
- Typically involves bloodwork and ultrasound; correlated
- Looking at development, chromosome disorders

Prenatal Screening Tests

Cell-Free DNA (NIPT) Testing

- *Typically private companies, will contract with OOH midwives*
- Can be done from 10+ weeks
- Only involves bloodwork
- Looking at development, chromosome disorders, fetal sex, fetal Rh

Can also be considered diagnostic

Prenatal Diagnostic Tests

Chorionic Villi Sampling (CVS)

- *Typically state-funded with genetic program, maybe private*
- Can be done from 8-13 weeks
- Involves sampling chorionic villi (placenta), either transvaginal (catheter through cervix) or transabdominal (needle aspiration) and ultrasound guidance

Prenatal Diagnostic Tests

Amniocentesis

- *Typically state-funded with genetic program, maybe private*
- Typically done at about 15-20 weeks
- Involves sampling amniotic fluid through needle aspiration and ultrasound guidance

Prenatal Diagnostic Tests

Risks

- Miscarriage
- Infection
- PROM
- Isoimmunization

Benefits

- Conclusive

Counseling Families on Options

Families should have full information on their options (*informed choice*) at the earliest appropriate gestation.

Include:

- Which tests are available in your area
- What tests can & cannot screen for
- Costs of tests
- Procedures of tests
- What their approach will be to results
- If certain results will risk them out of care; how your care will continue

Give written handouts for easy reference

To Test, Or Not to Test?

Screen: Preparation

Wants to screen in order to be better prepared; safe birth; community of care

Screen: Abortion

May not continue the pregnancy if certain conditions are present

Don’t Screen: Won’t Change Outcome or Approach

Accept possibility of unknown fetal anomalies

Wouldn’t change care plan based on results

Okay with postnatal assessments based on newborn exam

May or may not accept intervention if anomalies discovered after birth

Care Provider Ethics

These conversations and these offerings can be fraught conversations for us as well

Disability Justice

Is it right to offer clients screening for conditions that may bring disabled children into the world, knowing clients may terminate? Are disabled lives inherently unworthy? Are clients fully informed of fulsome lives and support for disabled folks? Are there enough resources for disabled children?

Abortion Referral

If I offer clients genetic screening, and they choose to terminate the pregnancy, am I obligated to refer for abortion care even if it is against my personal beliefs and values?

Supporting Clients with Known Anomalies

At times, our clients may be diagnosed with conditions they know will bring a short or challenging life to their child. They continue the pregnancy, and look for our support throughout.

- Appropriate genetic counseling
- Diagnostic testing, if desired (prenatal, postnatal)
- Safe birth plan may involve hospital
- Co-Care with MFM or OB/GYN
- Grief Support
- Robust postpartum care

Referring Clients for Abortion

At times, our clients may be diagnosed with conditions they know will bring a short or challenging life to their child. They choose not to continue the pregnancy.

- Appropriate genetic counseling
- Diagnostic testing, if desired (prenatal, postnatal)
- Referral for abortion services may involve specialists, may involve travel out of state
- May be deeply emotionally complex for families
- Robust postpartum care

Practical Scenario 1

Your client, Maria, a 40yo G1P0 has just come in for their initial appointment. They have had no ultrasounds so far in this pregnancy, and predict they are approximately 11 wks GA. After a comprehensive health history, you note her family has no history of unusual genetic conditions. Maria and her partner's families are both from Peru, but Maria has lived in your area her whole life.

- Do you offer Maria prenatal genetic screening?
- What elements of her health history should be taken into account for counseling around genetic screening?
- What types of genetic screening are most appropriate for Maria?

Practical Scenario 1

Maria opts to have first trimester prenatal genetic screening. After waiting for the report for 10 days, you receive the following:

Risk for Down Syndrome: 1:120
Screen: POSITIVE

- How do you interpret these results?
- How do you convey the results to Maria?
- What next steps do you offer Maria?

Practical Scenario 1

After careful consideration, Maria and her partner decide they would like to pursue diagnostic testing for Down's Syndrome. They're not sure exactly what they'll do if the diagnosis is positive.

- What options can you refer them to for diagnostic testing?
- What genetic counseling options are available?
- How confident are you with genetic counseling and interpretation of results?
- How do you feel about walking through this process with Maria?

Practical Scenario 2

Your client Iris is a 31yo G2P1 coming into care at 15 weeks GA. After a comprehensive health history, you note Iris's husband's brother has cystic fibrosis. She has had no prenatal care to date. Her previous birth wa uneventful with a healthy baby with no genetic anomalies.

- Do you offer Iris prenatal genetic screening?
- What elements of her health history should be taken into account for counseling around genetic screening?
- What types of genetic screening are most appropriate for Iris?

Practical Scenario 2

Maria opts to have NIPT prenatal genetic screening. After waiting for the report for 10 days, you receive the following:

Test Results — **Fetal cfDNA Percentage 20.3%**

CHROMOSOME	RESULT	PROBABILITY	RECOMMENDATION
Trisomy 21 (T21)	Low Risk	Less than 1/10,000 (0.01%)	Review results with patient
Trisomy 18 (T18)	Low Risk	Less than 1/10,000 (0.01%)	Review results with patient
Trisomy 13 (T13)	High Risk	1:20	Review results with patient

- How do you interpret these results?
- How do you convey the results to Iris?
- What next steps do you offer Iris?

CLINICAL DATA

	Detection Rate	False Positive Rate
T21	>99% (95% CI: 97.9-99.8%)	<0.1% (95% CI: 0.02-0.07%)
T18	97.4% (95% CI: 93.4-99.0%)	<0.1% (95% CI: 0.01-0.05%)
T13	93.8% (95% CI: 79.9-98.3%)	<0.1% (95% CI: 0.01-0.06%)

Detection and false positive rates based on risk cut-off of 1/100 (1%) and are based on singleton, non egg donor pregnancies.
Negative predictive value for Trisomy 21, 18, and 13 is greater than 99%.
Positive predictive value varies by prevalence.

Practical Scenario 2

After careful consideration, Iris and her partner decide they would like to pursue amniocentesis diagnostic testing. They have also booked an ultrasound for 16 weeks. If the amniocentesis is positive, and if there are any concerns on ultrasound, they plan to terminate the pregnancy.

- Where can you refer them for an amniocentesis?
- Where can you refer them for an ultrasound?

Practical Scenario 2

The amniocentesis returns POSITIVE for T13.
Ultrasound findings show ?microcephaly, ?abdominal wall defects, ?heart defects, consistent with T13.

- Where can you refer them for a later abortion?
- What sorts of counseling or resources are available for Iris?
- How do you feel about walking through this process with Iris?

How can you answer Iris' questions about future fertility?

Practical Scenario 3

Your client Jackie is a 39yo G1P0 coming into care at 8 weeks GA. This pregnancy was conceived with IVF, using a Day 5 frozen embryo transfer of genetically tested embryos. Jackie and her husband are African-American and their families have no history of genetic anomalies.

- Do you offer Jackie prenatal genetic screening?
- What elements of her health history should be taken into account for counseling around genetic screening?
- What types of genetic screening are most appropriate for Jackie?

Practical Scenario 4

Your client Khadija is a 28yo G3P2 coming into care at 18 weeks GA. She was not offered prenatal genetic screening with her previous care provider and has not completed any. She's not sure if she wants to. She notes being able to feel fetal movement at 16 weeks in her previous pregnancy but hasn't yet in this pregnancy. You order an Anatomy scan ultrasound, and results report missing views for the heart due to fetal position, no nasal bone, and abonormalities in the development of the skull.

- Do you offer Khadija prenatal genetic screening? Why or why not?
- What elements of this case should be taken into account for counseling around genetic screening? What do you suspect?
- What types of genetic screening are most appropriate for Khadija?

Practical Scenario 4

Khadija decides to proceed with an amniocentesis and detailed ultrasound coordinated with MFM. It takes approximately 2 weeks to get this all arranged. The amniocentesis results come back when Khadija is 22 weeks pregnant POSITIVE for Trisomy 18.

- What options are available to Khadija at this time?
- What is the prognosis for her fetus / newborn?
- What is your capacity and legal ability to continue to offer prenatal care, birth, and postpartum care for Khadija?
- What would you need in place to support YOU as her care provider?