Medical Genetics, Genetic Counseling and Ethics
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REQUIRED READING ASSIGNMENT

Chapter 20, pp. 523-529 and Problems 1-3; Chapter 15, pp. 457-458; Chapter 19, pp. 507-509.

LECTURE OBJECTIVES

To use case examples to

1. Illustrate ethical issues in contemporary genetics
2. Demonstrate an approach to addressing the ethical dimensions in medical genetics

STUDENT OBJECTIVES

At the end of the class, the student will be able to:

1. Recognize the issues of autonomy, beneficence, confidentiality, and justice in a medical genetic situation (V and Cases)
2. Appreciate the importance of understanding the facts and various options for decision-making (Cases)
3. Explain the elements of genetic counseling, its non-directive nature, and the physician's role. (II and VIII)
4. Apply an ethical problem-solving approach in a clinical encounter (VI and Cases)

IMPORTANT TERMS

1. Autonomy - respect for individual independence
2. Beneficence - the act of doing good
3. Code of Ethics
4. Confidentiality - respect for privacy
5. Genetic Counseling
6. Justice - fairness, conforming to principles of right or wrong

"Ethics critically examines values and how they are to be acted out; but whether they are acted out or not, loyalty to them depends on character or personal quality, and so it follows that the quality of medicine depends on the character of its clinicians." Joseph Fletcher

"Good ethics need good facts." Angela Holder

"[Questions about genetics] ...cut to a deeper level of psychological significance than do others in biomedicine.” Alex Capron
"People don't have a personal relationship with their DNA yet. It's been thought of as a chemical, basically. But what it actually is, it's part of your history. Think of how far your genes have come to get to you. They survived the Ice Age, lived lives very different from the lives we live now." John Seabrook

I. What Is The Contemporary Environment?

A. Family history since “Cain and Abel”
B. Genetics on front page at least weekly; 2008, passage of Genetic Insurance Nondiscrimination Act
C. OJ and DNA
D. Dolly and cloning
E. Stem cells and politics
F. Direct to consumer testing
G. Famous people and genetics? e.g., public discussion of organ transplants
H. Cycles of prophesy, regulation, and reaction
I. Muddling through
J. In the meantime, people live

II. What is Genetic Counseling?

Definition from the National Society of Genetic Counselors (NSGC):

Genetic counseling is the practice of helping individuals and families understand the medical, psychological, social and reproductive implications of genetic and congenital conditions. Elements of the practice include: assessment of the chance for recurrence or occurrence of a condition, education about inheritance, testing options, medical management, prevention, social support and research, and counseling to help clients adapt to the choices and to the psychological, familial and social issues that stem from the risk or condition in the family.

III. Why refer an individual or family for genetic evaluation and counseling?

A. Pre-conceptional counseling
B. Infertility not otherwise explained
C. Recurrent pregnancy loss
D. High risk ethnic background e.g. Jewish, African-American, Asian, French Canadian
E. Advanced maternal age (35+ years), although ACOG (American College of Obstetrics-Gynecology) now suggests informing women at ALL ages about prenatal testing
F. Advanced paternal age (40+ years)
G. Abnormal maternal serum screen (MSAFP, triple, or tetra screen); First trimester screen
H. Maternal exposures during pregnancy e.g. medications, substance abuse, workplace exposures
I. Maternal illness associated with increased risk for birth defects e.g., diabetes, epilepsy
J. Fetal abnormalities on ultrasound
K. Family history of/person with a single gene condition e.g., Fragile X, cystic fibrosis, sickle cell anemia, muscular dystrophy, Huntington disease
L. Family history of/person with a chromosome condition e.g., Down syndrome, Turner syndrome, Klinefelter syndrome
M. Family history of/person with a birth defect e.g., congenital heart defect, open neural tube defect, cleft lip/palate, multiple congenital anomalies
N. Family history of/person with intellectual disability or distinctive features, growth or neurologic alterations
O. Family history of cancer, particularly breast, ovarian, colon, or multiple cancers, or cancer at young age.
P. Family history of/person with unexplained death, severe illness at young age
Q. Critical newborn screen

IV. In practice, who provides genetic counseling?
A. Genetic counselors and medical geneticists
B. Scientists, cytogeneticists, biochemical and molecular geneticists
C. Physicians, increasing role for primary care providers and specialists
D. Nurses
E. Social workers
F. Other health care professionals

V. Ethical Issues
A. Autonomy - respect for individuals. How does this relate to families, non-directiveness, and institutional review boards (IRBs)?
B. Beneficence - do good and not harm. Do we have the duty to warn of possible harm?
C. Code of ethics - organized framework for professional decision making.
D. Confidentiality – privacy. What are the boundaries of self in era of DNA understanding? What is your relationship to your DNA? What are your responsibilities to your family?
E. Justice – fairness. How do we address stigmatization, eugenics, and the uninsured?

VI. Approach
A. What are the facts?
B. What ought one to do?
C. What are my personal values?
D. What are alternative solutions and their consequences?
E. Could I live with this action myself?
F. What matters most?

VII. **My Current Thinking**

A. Respect individuals
B. Support families
C. Enable choices
D. Teach the children
E. Support the public good (foster community)
F. Share gratitude and healing

VIII. **What does the genetic counseling/evaluation process involve?**

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<tr>
<th>Pre-assessment</th>
<th>Reason for referral</th>
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<tbody>
<tr>
<td></td>
<td>Collection of family history information</td>
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<tr>
<td></td>
<td>Clinical examination &amp; laboratory tests of relatives if indicated</td>
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<thead>
<tr>
<th>Clinical Dx &amp; Management</th>
<th>Consultand, possibly other family members</th>
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<tr>
<td>Recurrence risk estimation</td>
<td>Based on diagnosis, pedigree analysis, test results</td>
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<tr>
<th>Genetic counseling</th>
<th>Nature and consequence of disorder</th>
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<tbody>
<tr>
<td></td>
<td>Recurrence risk</td>
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<tr>
<td></td>
<td>Means of modification of consequences</td>
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<tr>
<td></td>
<td>Means of prevention of recurrence</td>
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<tr>
<td></td>
<td>(prenatal/preimplantation reproductive diagnosis &amp; counseling, other options)</td>
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<th>Follow-up care</th>
<th>Referral to appropriate specialists, resources, support groups, etc. as needed</th>
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<td>Continuing clinical assessment if needed</td>
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<td></td>
<td>Continuing support by genetic counselor if indicated</td>
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IX. **How far do we go? Who decides? Genetic Counseling-Room 1**

A 25-year-old woman finds she has a fetus with Down syndrome and a serious heart defect after maternal serum screening and amniocentesis. She chooses to terminate the pregnancy at 18 weeks. Follow-up chromosomes show the mother to be a translocation carrier. Her 20-year-old full sister is 10 weeks pregnant. She has a 50-50 chance of also
being a translocation carrier and therefore up to a 1 in 5 chance of having a baby with Down syndrome. Your patient is concerned about her sister and the rest of the family’s attitude toward abortion and doesn’t plan to tell her sister.

Figure 1

A. Facts
   1. Any 20 year old woman has ~1 in 1700 chance of having a baby with Down syndrome
   2. Maternal serum screening and ultrasound may screen for up to about 90%
   3. Current VA. legal precedent would not support breaking patient confidentiality
   4. Family is unit for genetic counseling

B. Options
   1. Take time to discuss pros and cons of not informing her sister
   2. Offer to write letter (anonymous?) to her sister or her sister’s MD
   3. Do nothing
   4. Others?

   1. At minimum, inform patients prior to testing and on receipt of results; information may have family implications
   2. As a general rule, respect confidentiality
   3. Exceptional circumstances, want legal privilege to breach
D. Exceptional circumstances that permit disclosure

1. Permissible where attempts to encourage disclosure on part of the patient have failed; where the harm is highly likely to occur and is serious and foreseeable; where the at-risk relative(s) is identifiable; and where either the disease is preventable, treatable, or medically accepted standards indicate that early monitoring will reduce the genetic risk.

2. “The harm that may result from failure to disclose would outweigh the harm that may result from disclosure.”

E. Ethical questions

1. Is confidentiality absolute?
2. If not, can exceptions be described?
3. Is it OK, if you warn the patient in advance that you may disclose?
4. Could the duty to warn become obligatory, rather than permissive?
   Tarasov law for MD with special relationship: person at risk is clear cut with foreseeable and serious harm
5. How do you keep up with new regulations?

F. Questions

1. What is your ultimate personal responsibility?
2. Who should be making this choice?
3. If both are members of the same HMO, is there any difference?
4. Should genetic testing ever be mandatory?
5. Others?

X. How Do We Divide the Pie? Genetic Counseling-Room 2

“My mother and her two older brothers all get their dialysis treatments paid for. I'll lose my job if they find out I have the same polycystic kidney disease or hypertension now; same for my son. Couldn’t we just do the DNA test on my mother, then I could get the less expensive testing? She might not understand but Medicare might pay for it.”

Refer to Thompson and Thompson Clinical Case Study # 32.

A. Facts

1. End-stage renal disease act covers dialysis and transplants
2. Sensitivity of imaging: 2 cysts in each kidney from ages 30-59 years and 4 cysts at >60 years → nearly 100% for APKD >30 years and those with PKD1 mutations; ~67% for those with PKD2
3. ADPKD (autosomal dominant polycystic kidney disease) is generally late onset, multi system disorder with bilateral renal cysts, cysts in other organs, intracranial aneurysms, mitral valve prolapse
4. Early treatment of hypertension may decrease complications
5. Informed consent not part of every lab test as currently practiced

B. Options

1. Get mother tested at next dialysis visit
2. Take time to see if research lab testing available (increasingly unlikely) that will not go through insurance
3. Pursue testing through insurance coverage
4. Check child’s blood pressure more frequently
5. Get ultrasounds on patient and her son
6. Others?

C. Questions

1. How can we deal with disease by disease or age by age entitlement approach?
2. “We are all diseased, just not diagnosed yet.” Francis Collins
3. Should employers discriminate on the basis of genetic predisposition?
4. Which conditions should receive priority?
5. What if this was you?
6. How do nations with universal access address genetic testing?

XI. How Can We be Smart and Wise? Genetic Counseling-Room 3

A 30 yo woman is told by her 40 yo brother that he has just been diagnosed with hemochromatosis. He developed diabetes, was not obese, and his MD thought of transferrin saturation testing. He is a homozygote for C282Y. She goes to her own MD who says you need a liver biopsy to diagnose hemochromatosis. She tells you, her friend, that she wants DNA testing. What do you do?

A. Facts
1. Hemochromatosis - ~1 in 9 Caucasians are carriers
2. Most common genetic condition in Caucasians
3. Diabetes, congestive heart failure, liver disease, sexual dysfunction
4. ~>60% C282Y homozygotes
5. Diagnosis, diagnosis, diagnosis

B. Options

1. Liver biopsy - risk and cost
2. Transferrin saturation? DNA testing?
3. What will insurance pay for?
4. Taking time to educate the primary MD?
5. Referral for genetic counseling?
6. Others?
7. Phlebotomy?

C. Questions

1. How do you keep up?
3. How do patients learn?

XII. **How Do We Go Forward? Genetic Counseling-Room 4**

A 20 yo woman who is employed with health insurance is in a wheelchair subsequent to spina bifida. She plans to get pregnant and refuses folate because she “doesn’t believe in taking medicines.” She saw a TV program on in utero surgery for NTDs and plans to demand it if the 4% risk for a child with spina bifida occurs.

A. Facts

1. CDC recommendations based on good data - 0.4 mg per day at least one month prior to conception and for first 3 months of pregnancy in all women; 4.0 mg in women with spina bifida or previous child with a NTD
2. Surgery performed on several dozen fetuses, no long-term follow-up yet, risks
3. Costly care

B. Options

1. Discuss best interests of fetus and pregnant woman’s interests/risks
2. Offer participation in research protocol
3. Work on communication and conflict resolution
4. Ask for judicial review

C. Questions

1. Are there ethics of family life - loyalty, intimacy, security?
2. Where is father? What are cultural competence issues?
3. What are reasonable expectations of patients?
4. Does the “yech” factor reflect wisdom?
5. Will we be like Midas, less human in quest for perfection?
6. What if it were myopia surgery?
7. How do we understand ourselves as our collective genetic understanding increases?
8. How do we balance non-directiveness, medical responsibility, resource issues, and society's needs?

XIII. Responsibilities of Professionals Providing Genetic Counseling

See References/Resources and note similarities between Code of Ethics for the American Medical Association and the National Society of Genetic Counselors

A. Competence, dignity, integrity, and self-respect
   1. Accurate and complete information
   2. Life-long commitment to learning
   3. Recognize limits of competence

B. Respect for patient autonomy, individuality, welfare, and freedom
   1. Keep confidences within constraints of law
   2. Serve fairly and equally

C. Respect for, care of, cooperation with, support of, and loyalty to their colleagues
   1. Peer support
   2. Ethical behavior
   3. Team approach often necessary and in best interest of patient

D. Promote well-being of society
   1. Work towards socially responsible change
   2. Prevent discrimination

XIV. Current U.S. Challenges

A. ~300 million people
B. ~45 million without health insurance
C. ~4 million births, ~2.5 million deaths, ~1 million abortions yearly
D. Majority of public lacks or distrusts scientific knowledge
E. Polarization of “haves” and “have not's”
F. Research, care management “competition” for $$

XV. Evaluate Your Decisions

A. Does it feel right?
B. Does it hurt anyone?/Does it include everyone?
C. How would it look on the front page of the newspaper?
D. Does it teach the next generation?

“Better to work with ourselves first, and our duplicates later.” Buddhist monk

REFERENCES/RESOURCES

[www.oml.gov/hgmis/elsi](http://www.oml.gov/hgmis/elsi) for ethical, legal, social issues related to the Human Genome Project


Hastings Center Reports (www.thehastingscenter.org)


STUDY QUESTION

Think of a clinical or family ethical dilemma you have personally encountered or about which you have knowledge. About what ethical principle(s) did conflict or concern arise? Did it have a generational or genetic component? Can you think of alternatives that might have lead to different outcomes of the dilemma?