Lecture #	Lecture Title	Length of lecture and associated practice questions (in minutes)	Contact Hours	CEUs	Lecturer	Behavioral Objectives Participants will:	Content Overview	Teaching Methods
1	Genetic Counseling in a Clinical Laboratory	30	0.5	0.05	Dharti Adhia	1. Define roles for a genetic counselor in a genetic clinical laboratory 2. Illustrate that clinical laboratories are a common work setting for genetic counselors 3. Evaluate how genetic counselors work together with other professionals in a laboratory setting	Speaker discusses what types of roles a genetic counselor may have in a laboratory setting and how a genetic counselor's skills are used in this setting. Includes some examples of how a genetic counselors uses different skills for different types of tasks.	Lecture
2	Preliminary Results and Other Common "Call-outs"	45	0.75	0.075	Amanda Rosenberg	1. Recognize different methods of results communication in a clinical genetics laboratory 2. Evaluate the role of preliminary results in the laboratory and how they may differ from final results 3. Review how genetic counseling skills assist in results communication in a laboratory setting	Speakers discuss who GC's may be calling out laboratory results to as well as situations in which the results may be called out. In addition, they discuss how a preliminary result may differ from a final result for different types of tests in the molecular and cytogenetic laboratories. Speakers also discuss communication skills that genetic counselors may use in calling out results to providers.	Lecture
3	Common Questions/Problems in the Lab	75	1.25	0.125	Jennifer Glass & Emily Wakefield	1. Describe common laboratory questions and problems 2. Explore why different situations in the laboratory can be problematic 3. Give examples of solutions and actions taken by genetic counselors in the laboratory	Speakers discusses common questions from healthcare providers in the laboratory setting including appropriate test ordering, test logistics, specificity and sensitivity, and billing among others. Speakers also discussed other common challenges in the laboratory setting such as incorrect samples, patients calling directly for ressults, order clarification, and unexcepted lab findings as well as how GC's may be involved in these situations in both a cytogenetic and molecular laboratory setting.	Lecture
4	Microarray Reporting	45	0.75	0.075	Lori White	1. Recognize differences in microarray types and platforms. 2. Identify resources for researching microarray anomalies. 3. Interpret information about microarray anomalies to write a micorarray report.	Speaker discusses different types of arrays including targeted vs. whole genome and BAC vs. oligo vs. SNP arrays. She then discusses indications for microarray as well as sample types. Finally, she discusses the different aspects of microarray interpretation and reporting including how a result is read and different resources that are used to research and interpret a result. The parts of a report and what may or may not be included is also discussed.	Lecture
5	Constitutional and Prenatal Cytogenetic Testing Methodologies	60	1	0.1	Stephanie Balow	1. Outline the history of cytogenetic testing 2. Describe the standard procedures for common cytogenetic tests 3. Compare different cytogenetic procedures including their strengths and limitations	Discuss in detail the processes that are involved in different cytogenetic tests including karyotype (including different types of banding), FISH, and microarray as well as how they are impacted by different sample types.	Lecture
6	Non-invasive Prenatal Testing (NIPT)	45	0.75	0.075	Lexi Coyan	1. Discuss NIPT terminology and different methodologies. 2. Intrepret NIPT results obtained using different NIPT methodologies.	Speaker will cover qualitative and quantitative methods of performing NIPT and the benefits and drawbacks of using each approach. This will also include a discussion of how results are impacted by fetal fraction and how the concepts of sensitivity, specificity, positive and negative predictive value are related to this test.	Lecture
7	Molecular Methodologies	60	1	0.1	Diana Brightman	1. Review PCR and Sanger sequencing including strengths and limitations 2. Discuss next generation sequencing including whole exome and whole genome sequencing methodologies and discuss strengths and limitations of each method.	Speaker discussed methods, strengths, and limitations of a variety of different molecular technologies including PCR, Sanger sequencing, next generation sequencing, STRs, MLPA, Southern Blot, whole exome and whole genome. The importance of understanding each technology for laboratory and clinical genetic counselors is also reviewed.	Lecture
8	Exome Sequencing	75	1.25	0.125	Sayaka Hashimoto	1. Describe the technical aspects of clinical exome sequencing 2. Demonstrate potential roles for exome sequencing in clinical care 3. Review types of filtering and bioinformatic analysis that may be involved in interpreting clinical exome sequencing	This lecture covers the pros, cons, and testing indications for whole exome sequencing. The process flow for this type of sequencing is reviewed in depth as well as how variants might be characterized. Finally the speaker reviews whole exome sequencing case examples.	Lecture
9	Variant Classification and Report Writing	120	2	0.2	Erin Mundt, Jessica Connor, Emily Wakefield	1. Review terminology and nomenclature related to variant classification. 2. Discuss the process for variant interpretation incorporating lines of evidence used to classify variants. 3. Discuss the importance and challenges of variant reclassification on patient care and management. 4. Evaluate the varying roles of GC's in the process of variant interpretation and reporting.	Speakers will provide an overview of variant classification and discuss various workflows that can be used in this process. Lines of evidence used to classify variants will be discussed in detail including relevant databases and how to handle contradictory information. Case examples of straight-forward and complex variant interpretation will be discussed. Finally, the various ways that GC's may be more or less involved in the variatn interpretation process in the laboratory and the value of understanding the process in the clinical setting will be reviewed.	Lecture, Case Examples
10	Oncology Testing Methodologies	60	1	0.1	Kristen Sund	1. Differentiate between hereditary and acquired genetic changes associated with cancer 2. Analyze the goals associated with acquired change genetic testing 3. Identify genes associated with oncogenesis	Speaker discusses the history of testing for acquired genetic mutations and how the goals for this type of testing differ from the goals for constitutional genetic testing. Examples that are covered in detail including monitoring cancer disease progression, monitorin bone marrow engraftment post-transplant, and oncology testing to help guide treatment.	Lecture
11	Ethical Issues in the Laboratory	30	0.5	0.05	Emily Wakefield	1. Give examples of ethical delimmas faced by genetic counselors in a clinical genetics laboratory setting 2. Recognize the similarities between ethical issues faced by laboratory and clinical genetic counselors	Guiding ethical principles are reviewwed and then used to assess case examples of common ethical issues that may arise in a genetic testing laboratory. Examples include, among other, microarray detection of large regions of homozygosity, prenatal testing for familial mutation found through research testing, incorrect tests being ordered, and incidental findings.	Lecture, Case Examples
12	Laboratory Utilization Management	45	0.75	0.075	Kathleen Collins	1. Describe the process and things to consider when establishing a laboratory utilization management program. 2. Outline examples of how laboratory utilization management can impact an individual, institution, or healthcare system.	Speaker will discuss laboratory utilization management strategies to address test order errors, test interpretation errors, failure to retrieve results, and patient/healthcare costs. She will also discuss how and why genetic counselors are a good fit for being involved in these efforts. She will discuss research that has shown how these types of programs can ensure the right test for the right patient at the right time.	Lecture
13	Laboratory Regulation	45	0.75	0.075	Brian Dawson	1. Review regulatory landscape for clincal laboratories including CMS, CDC, FDA, CLIA, and CAP roles. 2. Identify information that can be used to determine if laboratory is meeting quality standards.	Speaker will outline the historic timeline of regulation development releveant to clinical genetic testing leading the current role of a variety of federal agenies. He will discuss what it means to have "deemed status" and what role professional organizations are playing in ensuring laboratory quality. He will also discuss the on-going evaluation of FDA regulation of Laboratory Developed Tests.	Lecture
14	Quality Assurance/Quality Control in the Laboratory	30	0.5	0.05	Lori Reimer	1. Define quality control, quality assurance, and quality improvement 2. Identify the components of a good quality assurance program	The differences between quality control, quality assurance, and quality improvement are explored. Examples of ways that labs perform these programs are covered including, among others, method validation, equipment maintence, equipment validation, proficiency testing, standard operating procedures. Potential GC roles in quality improvement are also discussed.	Lecture
15	New Test Development	45	0.75	0.075	Jennifer Glass	1. Describe the necessary steps in new test development in a clinical genetics laboratory. 2. Explore how and when genetic counselors may be involved in the new test development process	Speaker will go through the steps in new test development including test proposal, test design, research and development, verification, validation, implementation, maintenance, and retirement. This will include a discussion of the reasons to develop new tests and the reasons a test may not come to market. She will also discuss skills that genetic counselors have that allow them to assist in this process.	Lecture
16	What's the Difference? Academic vs. Industry Clinical Laboratories	75	1.25	0.125	Sayaka Hashimoto	1. Define the different types of clinical diagnostic laboratories 2. Recognize the similarities and differences between academic and industry laboratories 3. Describe the benefits and limitations of each type of laboratory	Speaker discusses the history of academic and commercial genetic testing laboratories as well as some of the similarities, differences, and challenges in each setting (including a discussion of hybrid academic/commercial labs). She also discuscses ways in which GC roles may or may not different between the two settings.	Lecture
17	Roles of Genetic Counselors in Laboratories and Industry	60	1	0.1	Kaitlin Allsbrook, Leslie Bucheit, Jessica Connor, Abby Masunga, Kirsty McWalter, Erin Mundt, Emily Wakefield, Jody Wallace	1. Outline the various roles that genetic counselors can take on in laboratory or industry settings. 2. Describe genetic counseling skills and how they can be applied to a variety of different roles.	Each speaker on this virtual panel will outline their current role in a laboratory or industry setting. They will discuss what skills they learned as a genetic counseling student that they use in their current role and also what skills they developed on the job in this role. The videos in this panel can be watched in any order.	Virtual Panel (each presenter discusses their role for 5-15 minutes)
18	Clinical Genomic Sequencing	60	1	0.1	Jennifer Berkowitz, Liz Heise	1. Define genome sequencing and general laboratory work flow. 2. Identify benefits and limitations of genome sequencing vs. exome sequencing vs. Sanger sequencing 3. Evaluate best candidates for clinical genome sequencing. 4. Review considerations for choosing a laboratory to perform clinical genome sequencing	Each speaker describes the technology used to perform genome sequencing and the workflow from a laboratory perspective. The speakers discuss the indications for genome sequencing and the benefits/limitations compared to other testing technology. They also discuss ways to compare laboraties that offer genome sequencing.	Virtual Panel (each presenter discusses their role for 5-15 minutes)
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