Criteria	Explanation
Accurate and sufficient information provided about related concepts	*Risk communication* "The risk of having a child with a chromosomal disorder increases as a woman ages. For instance, a 35-year-old woman has a 1 in 192 (less than 1%) chance of having a baby with a chromosomal disorder. The chance increases to 1 in 66 (about 1.5%) in a woman aged 40 years." (1) "In general, in each subsequent pregnancy the chance of having another baby with Down syndrome is about 1 in 100 up to age 40. After age 40, the risk is based on the mother's age. If, however, the first child has translocation Down syndrome, the chance of having another child with Down syndrome may be greatly increased." (6) "Results of the quad screen indicate your risk of carrying a baby who has certain chromosomal conditions, such as Down syndrome." (7) "Once a woman has given birth to a baby with Trisomy 21, it is estimated that her chances of having another baby with Trisomy 21 is 1% greater than her chances by age alone." (9) "Maternal age, however, is not linked to the chance of having a baby with translocation. Most cases are sporadic, chance events, but in about one third of translocation cases one parent is a carrier of a translocated chromosome." (10) "There is no definitive scientific research that indicates that Down syndrome is caused by environmental factors or the parents' activities before or during pregnancy." (11) "The older a pregnant mother is, the higher her chance is of having a baby with a genetic disease." (12) "The risk for chromosomal abnormalities gradually increases with age, but a woman of any age can have a baby with a chromosomal abnormality." (15) "The mother's age at delivery is the only factor found to be linked to the risk of having a baby with Down syndrome." (21) "While you can decrease the incidence of some risk factors, others are not in your control. Also, not all risk

Criteria	Explanation
	factors will have an effect on outcomes in all pregnant women and babies." (24) "The risk of having a child with Down syndrome gradually increases with the age of the mother, but can occur at any maternal age." (25) "One factor that increases the risk for having a baby with Down syndrome is the mother's age." (27) "Women age 35 and older have an increased chance of giving birth to a baby with Down syndrome." (30) *Genetics education* "Down syndrome is a caused by extra genetic material from chromosome 21. Chromosomes are the structures in cells that contain the genes. Each person normally has 23 pairs of chromosomes, or 46 in all. An individual inherits one chromosome per pair from the mother's egg and one from the father's sperm. When an egg and sperm join together, they normally form a fertilized egg with 46 chromosome. Sometimes something goes wrong before fertilization. A developing egg or sperm cell may divide incorrectly, sometimes causing an egg or sperm to have an extra chromosome 21. When this cell joins with a normal egg or sperm cell, the resulting embryo has 47 chromosomes instead of 46. Down syndrome is called trisomy 21 because affected individuals have three number 21 chromosomes instead of two. This type of error in cell division causes about 95 percent of the cases of Down syndrome. Occasionally, before fertilization, a part of chromosome 21 breaks off during cell division and becomes attached to another chromosome in the egg or sperm cell. The resulting embryo may have what is called translocation Down syndrome. Affected individuals have two normal copies of chromosome 21 plus extra chromosome 21 material attached to another chromosome. This type of error causes about 3-4 percent of the cases of Down syndrome. In some cases the parent has a rearrangement of chromosome 21 called a balanced translocation, which does not affect his or her health. About 1-2 percent of individuals with Down syndrome have a form called mosaicism. In this form the error occurs after fertilization. Affected individuals have some cells with an extra chromosome 21 and others with a normal number." (6/7) "Down syndrome is usually caused by an error in cell division called 'nondisjunction'. Nondisjunction results in an embryo with three copies of chromosome 21 instead of the usual two. Prior to or at conception, a pair of the 21st chromosomes in either the sperm or the egg fails to separate. As the embryo develops, the extra chromosome is replicated in every cell of the body. This type of Down syndrome, which accounts for 95% of cases is called Trisomy 21. The two other types of Down syndrome called mosaicism and translocation. Mosaicism occurs when nondisjunction of chromosome 21 takes place in one but not all-of the initial cell divisions after fertilization. When this occurs, there is a mixture of two types of cells, some containing the usual 46 chromosomes and others containing

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	47. Those cells with 47 chromosomes contain an extra chromosome 21. Mosaicism accounts for about 1% of all cases of Down syndrome. Research has indicated that individuals with mosaic Down syndrome may have fewer characteristics of Down syndrome than those with other types of Down syndrome. However, broad generalizations are not possible to the wide range of abilities people with Down syndrome. Translocation accounts for about 4% of all cases of Down syndrome. In translocation, part of chromosome 21 breaks off during cell division and attaches to another chromosome, typically chromosome 14. While the total number of chromosomes in the cells remain 46, the presence of an extra part of chromosome 21 causes the characteristics of Down syndrome. Regardless of the type of Down syndrome a person may have, all people with Down syndrome have an extra, critical portion of chromosome 21 present in all or some of their cells. This additional genetic material alters the course of development and causes the characteristics associated with Down syndrome." (9/10/11) "Down syndrome is a condition that is usually caused by an extra copy of the 21st chromosome-genetic building blocks of all people." (13) "*Aneuploidy* is when a person has extra copies are missing copies of certain chromosomes. Most people have to copies of each of 23 different chromosomes, for a total of 46. *Trisomy* is when there are three copies of a certain chromosome in all the cells in the body." (17) "Normally in reproduction, the egg cell of the mother and the sperm cell of the father start out with the usual number of 46 chromosomes. The egg and sperm cells both undergo a cell division in which the 46 chromosomes are divided in half, so that both the egg and the sperm cells will have 23 chromosomes each. When a sperm with 23 chromosomes fertilizes an egg with 23 chromosomes, the baby will have a complete set of 46 chromosomes, half from the father and half from the mother. Sometimes, an error occurs when the 46 chromosomes are being divided in half, and an egg or sperm cell keeps both copies of the 21st chromosome instead of just one copy. If this egg or sperm is fertilized, and the baby will have three copies of the #21 chromosome, which is called trisomy 21, or Down syndrome. The features of Down syndrome are caused by the extra copy of chromosome #21 being in every cell in the body. Most cases of Down syndrome are caused by trisomy 21. Occasionally, the extra chromosome #21 or a portion of it is attached to another chromosome in the egg or sperm; this may cause 'translocation Down syndrome'. This is the only form of Down syndrome that may be inherited from a parent. Some parents have a rearrangement called a balanced translocation, in which the #21 chromosome is attached to another chromosome, but it does not affect their own health. Rarely, another form called 'mosaic Down syndrome' may occur when an error in cell division happens after fertilization. These individuals have some cells with an extra chromosome #21 (47 chromosomes total), and other cells have the usual number (46 total)." (21) "Down syndrome is a condition in which a person has an extra chromosome. Chromosomes are small 'packages' of

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	gene in the body. They determine how a baby's body forms during pregnancy and how the baby's body functions as it grows in the womb and after birth. Typically, a baby is born with 46 chromosomes. Babies with Down syndrome have an extra copy of one of these chromosome, chromosome 21. A medical term for having an extra copy of a chromosome is 'trisomy'. Down syndrome is referred to as Trisomy 21. This extra copy changes how the baby's body and brain develop, which can cause both mental and physical challenges for the baby. (27) *Labeling and language use* "Chromosomal disorders are disorders caused by missing, damaged, or extra chromosomes. These problems often are caused by an error that occurred when the egg or sperm was forming. Most children with chromosomal disorders have physical defects, and some have mental defects." (1) "Down syndrome – mental retardation, abnormal features of the face, and medical problems such as heart defects occur as a result of an extra chromosome 21 (trisomy 21)." (3) "Down syndrome is a chromosomal disorder that includes a combination of birth defects. Affected individuals have some degree of intelligential disability, characteristics facial feature and, often, heart defects and other health problems. The severity of these problems varies greatly among affected individuals." (6) "A few of the common physical trait of Down syndrome are low muscle tone, small stature, an upward slant of the eyes, and a single deep crease across the center of the palm – although each person with Down syndrome is a unique individual and may possess these characteristics to different degrees, or not at all." (11) "An example of a genetic disease due to an abnormal chromosome is Down syndrome. Most people have two #21 chromosomes but people with Down syndrome have three 21's. People with Down syndrome have mental and physical retardation." (12) "The range of medical conditions and abilities can vary widely for people with Down syndrome. Each person with Down syndrome has his or her own strength and weakness that no one can predict before birth. People with Down syndrome have mild to moderate intellectual disabilities, low muscle tone, and higher chance of health issues, particularly heart conditions. While people with Down syndrome do face challenges, recent advances in healthcare, education and attitudes have greatly improved their lives. This progress has given them more opportunities as valued members of their communities. This means that more people with Down syndrome are finishing school, finding jobs, and having relationships." (13) "Down syndrome is also known as trisomy 21. It is caused when a person has an extra copy of chromosome number

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	21. Down syndrome affects people in different ways. People with Down syndrome always look different than other members of their family. They always have some developmental delay, but the level of delay differs from person to person. Adults with Down syndrome may be able to play sports, have a basic job, and enjoy friends. But they usually cannot live on their own without help. Many babies with Down syndrome have a heart defect, which can sometimes be fixed with surgery. Other health problems and birth defects sometimes occur with Down syndrome, but they are rare." (16) "Trisomy 21 is when there are three copies of the chromosome number 21 in all cells. It is the most common cause of a genetic condition called *Down syndrome*." (17) "Down syndrome is a genetic disorder that involves birth defects, intellectual disabilities, characteristic facial features. Additionally, it often involves heart defects, visual and hearing impairments, and other health problems. The severity of all these problems varies greatly amount affected individuals." (21) "Down syndrome is a chromosome condition associated with intellectual disability, a characteristic facial appearance, and low muscle tone in infancy. The degree of intellectual varies from mild to severe. People with Down syndrome may be born with a variety of health concerns, including heart defects or digestive abnormalities. In addition they have greater risk of developing gastroesophageal acid reflex, celiac disease, hyperthyroidism, vision problems, leukemia and Alzheimer's disease." (23) "Even though people with Down syndrome might act and look similar, each person has different qualities. People with Down syndrome usually have an IQ "a measure of intelligence" in the mild or moderately low range and are slower to speak than other children." (27) "Trisomy 21 called Down syndrome, is associated with mild to moderate intellectual disabilities and may also lead to digestive disease and congenital heart defects." (29)
Accurate and sufficient information provided about testing methods	• Are screening and diagnostic testing methods differentiated and explained? "If the results of the screening test or other factors raise concerns about your pregnancy, diagnostic tests can be done to provide more information." (3)" "Diagnostic tests can provide a definitive diagnosis with almost 100% accuracy." (11) "If the results of the screening test than normal, doctors usually offer further diagnostic testing to determine if birth defects or other possible problems with the baby are present. These diagnostic tests are offered to women with

Criteria	Explanation
	higher risk pregnancies, which may include women who are 35 years of age or older; women who had a previous pregnancy affected by a the birth defect; women who have chronic diseases such as this high blood pressure, diabetes, or epilepsy; or women who use certain medications." (6) • Are the purpose(s) discussed? "Diagnostic tests detect whether certain birth defects are present." (1) "Amniocentesis (also called amnio) is a common prenatal test used to diagnose certain birth defects and genetic conditions. Genetic conditions are health conditions and birth defects that are passed down to a baby from mom and dad. They may cause health problems the baby." (5) "Prenatal diagnostic procedures are specialized tests that can accurately diagnose certain birth during pregnancy." (15) • Does it mention that having such testing is voluntary or a personal choice? "Whether or not to undergo a prenatal screening and diagnostic test is a personal decision, and expectant parents must make the choice that is best for them." (13) "Choosing whether to have any of these test, or deciding which ones are best for you, can be hard. There is no "right" choice. Some women choose only an anatomy ultrasound and no other tests. Others may choose an integrated screen and anatomy ultrasound. And, if one of these tests is abnormal, they may have amniocentesis. Some women prefer a CVS or amniocentesis without any of the screening tests." (16) "This handout gives information to help you decide if you want to have an advanced aneuploidy screening test. Having this test is up to you. Some people do not find this type of test to be helpful. You may refuse testing at any time." (17) "Having this test is up to you." (19) "Doing a quad screen is your choice, and the decision is a personal one." (20) "When a woman finds she is pregnant, she faces many choices. One important choice is whether to have a maternal serum screening test, such as *FirstScreen*, to determine if she is at increased risk of having a baby with certain birth

Criteria	Explanation
	defects" (25) "The decision to consent to, or to refuse the above test is entirely mine." (29)
Options and potential outcomes explained	• Are potential benefits mentioned? "A prenatal screening tests named 'MaternT21,' has been made available by the company went Sequenom. This test, which can only be ordered through a physician, involves blood being taken from the expectant mother, as early as 10 weeks of gestation, and relies on the detection of cell free DNA that circulates between the fetus and the expectant mother. According to the latest research, this blood test can detect up to 98.6% of fetuses with trisomy 21. A 'positive' result on the test means that there is a 98.6% chance that the fetus as trisomy 21; a 'negative' result on the test means that there is a 99.8% chance that the fetus does not have trisomy 21. The turnaround time for the test is about 8-10 days and approximately 0.8% of patients did not receive a result due to technical standards." (13) "Knowing about a birth defect before birth may help you get ready emotionally to care for your baby." (5) "Some women feel that having more information about the baby's health will help them prepare better for the baby's arrival." (18) "It [cell-free fetal DNA testing] is the most accurate screening test for aneuploidy available today." (17) "First trimester screening leads to the detection of approximately 83% Down syndrome cases and 80% of trisomy 18 cases." (25) "The harmony tests has been shown to have detection rate of up to 99% and false positive rate as low as 0.1% for trisomy 21, 18 and 13." (29) • Are potential harms mentioned? "Diagnostic tests such as amniocentesis or chorionic villus sampling (CVS) are accurate for detecting fetal trisomy, but they are invasive and pose a slight risk for fetal loss." (29) "Are there any risks to having an amnio? Some women find that having an amnio is painless. Others feel cramping when the needle enters uterus or pressure when the fluid is removed. One to 2 out of 100 (1 to 2 percent) have cramping, spotting when we gain amniotic fluid after the test. Your provider may tell you to avoid intense activity

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	and take it easy for the rest of the day. Serious complications from amniocentesis are rare. However, the test does involve a small risk of miscarriage. According to ACOG, less than one in 200 women (less than 1 percent) have a miscarriage after amniocentesis." (5) "The doctor will take steps to make the risks of the CVS as low as possible, but no procedure is completely risk-free. The major risk from CVS is miscarriage. A miscarriage may occur if an infection start uterus, if the placenta separates from the uterus, or if the sac surrounding the baby doesn't heal after the procedure, allowing amniotic fluid to leak out. Without CVS, about 2% to 3% of pregnancies will miscarry between 8 and 14 weeks. CVS adds an extra 1% (1 out of 100) risk of miscarriage. Said another way, out of every 100 CVS procedures done, 99 women (99%) do **not** have a miscarriage. Early studies of CVS raised the concern that it increases the risk of birth defects of the fingers and toes. This risk is not increased if a CVS is done after 10 weeks of pregnancy." (18) • Is it mentioned that information gained may impact future pregnancy management decisions? "Some parents want to have a prenatal diagnosis so that they can discontinue their pregnancy. Parents should discuss this option with their obstetrician." (10) "Parents have different reasons for wanting to know about their child's health. Some plan to terminate the pregnancy if the fetus is seriously unhealthy. Others want to prepare for the challenge. For certain medical conditions, the fetus can be treated during pregnancy." (12) "After receiving a prenatal diagnosis in learning more about Down syndrome, some families opt to terminate." (13) "Having a diagnosis allows parents to make choices, such as choosing an adoption plan or stopping the pregnancy." (18)
Potential financial implications and conflicts of interest disclosed	• Are financial costs discussed? "Does insurance cover this test? The list price for the test is $795. With the additional screening for the X and Y chromosome, the price is $815. Unfortunately, we have no information about whether insurance companies will cover the cost or the amount of coverage. We strongly recommend that the patient contact her insurance provider directly to determine coverage, including deductibles and co-pays." (22)