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REVIEW ARTICLE

Obstetric Ultrasound: Balancing Recommendations with Expectations

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ABSTRACT

Obstetric ultrasound is unlike any other form of medical imaging. The expectations of the provider performing the ultrasound are dramatically different from those of the woman receiving the ultrasound. Ultrasound providers are often put into situations where the practice of medicine is superseded by expectations of a pregnant woman and her family who see themselves as consumers of 'medictainment' rather than patients. Women come to obstetric ultrasound with the primary expectation to hear the simple news that their baby is normal and most wish to know the fetal sex as a secondary piece of information. They would also like to have information ahead of time about what to expect from an ultrasound examination experience. Ultrasound physicians are charged with the task of identifying something wrong, providing a definitive diagnosis, and communicating it in a balanced and relatively unemotional manner, while at the same time being beneficent and respectful of patient autonomy. Patients may not want to find out that something is wrong, but when there is, they want direct, compassionate communication, and a plan of action.

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INTRODUCTION

Obstetric ultrasound is unlike any other form of medical imaging. The expectations of the provider performing the ultrasound are dramatically different from those of the woman receiving the ultrasound. There are no other modalities, where the findings and the experience so uniquely affect a patient, her family, and a second unborn patient. Families do not routinely request to witness and document X-rays, magnetic resonance imaging (MRIs), computed tomography (CT) scans, or ultrasounds performed on non-gravid body parts, such as lungs, livers, or testicles like they do during an obstetric ultrasound. Although routine ultrasound in low risk pregnancy has not been proven to reduce perinatal mortality and morbidity, in Western Europe and now commonly in the United States, second trimester ultrasound screening for fetal anomalies has become a standard part of prenatal care.[1]

Ultrasound providers are often put into situations where the practice of medicine is superseded by expectations of a pregnant woman and her family who see themselves as consumers of 'medictainment' rather than patients. Physicians do obstetric ultrasound to identify and treat maternal-fetal problems. Patients more often than not come to ultrasound expecting to hear that everything is 'normal' and to take home proof to share with friends, family, and often the world via social media.

Most parents are not typically prepared for the myriad of actual or suggested problems that could be discovered during a detailed obstetric ultrasound. Scientific concepts of embryology and the billions of interactions that have to go right to create a normal baby, are not commonly taught in our education system in the United States. Families often believe that a first or second trimester fetus is just a miniaturized version of an 8 pound newborn and are disappointed or frightened when the ultrasound pictures do not look like what is expected.

The popular pregnancy guide with 18 million copies in print, What to Expect When You're Expecting (4th edition), has been quoted to have been read by over 90% of women who read pregnancy guides.[2] The book contains over 500 pages. There are chapters that reasonably cover pregnancy loss, aneuploidy screening, first and second trimester ultrasound, and prenatal diagnosis, although with emphasis that 'the vast majority of babies whose possibly at risk moms undergo such testing will receive a perfect bill of health.'[3] By comparison, a single page entitled 'If a problem is found' provides only very general information about fetal abnormalities. The author conceived the idea for the book when 'she could not find answers to her questions or find reassurance for her worries in the books she turned to for advice.' 'She was determined to write a guide that would help other expectant parents sleep better at night'.[4] The average pregnant women tends to idealize the experience and does not want to imagine let alone discuss the possibility

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of her baby having an abnormality. During an ultrasound, the mere mention of something not completely 'normal' permanently changes the relationship between doctor and patient.

Commercialization and Social Mediatization of Pregnancy and Childbirth

The baby care market was worth 44.7 billion US dollars in 2011 and is expected to increase total sales to 66.8 billion US dollars by 2017.[5] The pregnancy and baby industry has gone far beyond diaper and baby food commercials to pressure new parents to buy baby and maternal products they may or may not need well before the baby is born. Companies use data mining to find and sell to pregnant women. As of July 25, 2015, an internet search for 'baby registries' yielded 3,540,000 results and a search for 'pregnancy blogs' yielded 127 million results. Many products are gender identified and link ultrasound gender determination to what many parents feel as an expected step in preparation for baby's arrival. Pregnancy and all the paraphernalia that goes with it is popularized in movies, music videos, and reality television. Cradle to grave market strategies have extended to the womb. Without much data to confirm efficacy or safety, advertisements encourage pregnant women to interact with the unborn fetus by way of 'prenatal education systems' which are audio devices that are strapped to the pregnant abdomen that play sounds thought to be stimulating but 'safe' for the fetus in an effort to 'jump start learning'.[6]

According to the market research company, HYVE, new parents spend approximately $ 6200 on baby-related goods and services during the first year and this is inexorably linked to the internet. The 91.9% moms use the internet daily. Almost 62% of US moms post about brands on social media sites, and approximately 58% regard the internet as essential to their lives. United States mothers spend about 2.5 hours on the internet daily, while 1 in 3 bloggers are mothers. Young parents today are from generation Y (born between 1980 and 1995). They highly differ in their tastes, needs and parenting style to previous generations. They have high demands regarding functionality, style, comfort, and sophistication and they are willing to pay for it.[7] ABC news reported in 2013 that according to Byte Mobile (a research firm that anomalously tracks data usage statistics from mobile networks), 47% of total mobile subscribers using one or more health application (app) are using a pregnancy related app. Moreover, there were over 1000 smart phone apps related to pregnancy and the majority were not vetted by physicians.[8]

In today's world, pregnancy can incite a form mini-celebrity or '15 minutes of fame' for the pregnant woman thanks to the onslaught of the popularity of social media, internet, and glamorization of celebrity pregnancies. The glamorization of ultrasound came to pinnacle when the actor Tom Cruise purchased his own medical grade ultrasound machine to use at home and commercials with perfectly post processed 3D images of fetal faces set to emotional music were aired on television. Celebrities have become self-proclaimed pregnancy and child care experts and as a result earn significant income by advertising their pregnancy experiences and the baby/childcare product lines they advertise or create.

Unlike past generations where pregnancy was hidden or minimized as part of polite society, a modern pregnant woman not only gets attention from family and friends, but more commonly from anyone in the world if a family is savvy with social media. Week to week and month to month blogs that track every moment of an individual woman's pregnancy experience by way of ultrasound photos and time lapse photography are now common. Facebook launched the 'Expecting-A-Baby' bio option in 2012. Parents are creating profiles for unborn children despite age restrictions for account holders. As of August 2, 2015, a YouTube search for 'baby ultrasound pictures' yielded 28,000 results. Social media users who question the egregious sharing of private pregnancy and delivery photos and or videos as 'oversharing' are often highly criticized.[9] In the December 17th, 2012 issue, The New Yorker depicted the following cartoon with a Facebook, Twitter, and YouTube feed on the ultrasound's computer screen (Fig. 1):[10]

Laura Tropp, PhD is an Associate Professor and Chair of the Communication Arts Department at Marymount Manhattan College. She studies and writes extensively about the public interest in pregnancy. She has eloquently described and dubbed this phenomenon 'The pregnancy-industrial complex' citing that 'pregnancy has been

Fig. 1: On December 17th, 2012, The New Yorker ran this cartoon with a Facebook, Twitter and YouTube feed on the ultrasound's computed screen

reimagined from a period of natural waiting to one where, each month, there is something else to do and buy.' She acknowledges that 'tracking the belly bump is fashionable and elaborate gender reveal parties have replaced the birth announcement.' The media hype to sell the celebrity pregnancy experience trickles down to regular people. She writes, 'The celebrity experience invites mimicry. The hyper-focus on the celebrity pregnancy turns the pregnancy experience into a commodity for everyone. When pregnancy becomes another overhyped, over romanticized, over marketed product, the experience itself is bound to be a letdown. Post-birth women in the United States are left with pictures, a newborn that needs constant care and often little support'.[11]

When expectations created from media are so high for a woman to have a certain type of pregnancy experience that includes perfect ultrasound keepsakes, there is going to be disappointment somewhere along the way. Such disappointment may play out in obstetric ultrasound units all over the country.

What do Patients Expect from Obstetric Ultrasound?

There has been limited study regarding patient expectations from obstetric ultrasound. Two studies targeted at attitudes about fetal gender indicated that the majority of women want to know the gender of the fetus. A 2004 study in Boston Massachusetts at an Obstetrics and Gynecology ultrasound referral center investigated 1340 pregnant women and or their partners who filled out a survey after undergoing an obstetric ultrasound.[12] The center performed ultrasound on low and high-risk pregnancies. Although percentages were not reported, the authors cited that many of the ultrasounds performed were for indications of current pregnancy problems or past pregnancy problems. Approximately 230 mothers and 300 fathers were over 35 years old. One third of the women were multigravidas and two-thirds were nulliparous. The majority were Caucasian and had finished college. Fifty-eight percent of mothers and 58% of fathers learned or planned to learn the gender of the baby before delivery. Factors most associated with wanting to learn the fetal sex were conceiving accidentally, finding out the sex in a previous pregnancy, not planning to breastfeed, influence of sex on future childbearing plans, planning a move or renovation dependent on sex, and specific parental sex preference. Only 6% of women wanted to know the fetal sex for purposes of emotional attachment or bonding. Ninety-one percent of participants who had determined the sex prenatally in a previous pregnancy wanted to learn the sex in the current pregnancy. Twenty-five percent wanted a medically unindicated ultrasound just to discover the fetal sex. Only 5% of mothers and fathers were discordant about wanting to know the fetal sex. If the mother or the father had no gender preference the desire to know the sex was reduced compared to those with a sex preference (55% *vs* 72% respectively). Demographic factors most associated with wanting to learn the fetal sex were father without full-time job, lower household income, unwed mother, maternal age less than 22 or greater than 40 years, no college degree, race other than white, and religion other than Catholic.

The most common reason for wanting to know the fetal sex for both the mother and the father was for planning and preparation. The most common reason for not wanting to know was wanting a surprise at birth and or the element of suspense. Interesting reasons for wanting to know the fetal sex were:

- If I am going to have a level II ultrasound, I want to take advantage of the technology.
- My mom has been fighting breast cancer and might not be with us when the baby is born. If this was not the case, we probably would not want to know.
- (We want) to avoid disappointment at the time of birth.
- Lost a baby boy-apprehensive about having a boy.
- Provision of some possibly illusory sense of control.

Interesting reasons for not knowing the fetal sex were:

- Tradition
- Do not want to get too attached in case of a problem.
- We found out last time. This time I want the surprise. I felt like something was missing during the birth by already knowing.
- I love surprises, and there are not really opportunities for true surprises as an adult.

The authors postulated that there could be cultural aspects within populations that could explain difference in the desire to know fetal sex before birth. For example, nonwhite and or non-Catholic participants wanted to learn the fetal sex more frequently than white and Catholic participants. There was no data collected in this study regarding cultural mores or the desire/expectation for take home keepsakes.

In 2012, researchers in the Netherlands published a study that showed 69% of pregnant women and 77% of their partners surveyed wanted to know the sex of the fetus after amniocentesis.[13] The questionnaire was completed by 210 pregnant women (± partners) in 2009 to 2010. All of the women had been referred for prenatal diagnosis to exclude Down syndrome. Sixty-eight percent were multigravidas. Ninety-five percent were married or cohabitating. Fifty-seven percent were not religious and just over half had higher education. Questionnaires were handed out at the time of second trimester genetic amniocentesis and could be completed just before the procedure or later at home.

The prospective parents did not have a sex preference (86% of women and 82% of partners indicated no preference), and most had chosen a name for both a boy and a girl. Picking out a name was not associated with the desire to know fetal sex. Ninety-seven percent of women stated they were not influenced by others to know the fetal sex. Sixty percent of the expectant mothers who wanted to know the sex of the baby were planning to tell family and friends. Almost 80% of those women knew people in their environment who also wanted to know fetal sex. There was no apparent association between the level of maternal education and her desire to know fetal sex.

Nearly all the women received an ultrasound in the mid trimester. Ninety-six percent of the women thought the ultrasound was reliable in detecting fetal sex although surprisingly only 28% were willing to be informed about the fetal gender at the time of the ultrasound. Sixty-five percent preferred this information to be included in the amniocentesis result, 4% after both amniocentesis and ultrasound, and 3% had no preference for the origin of the results. Only 7.7% of women reported knowledge about sex chromosome abnormalities like Turner's syndrome or Klinefelter's syndrome.

The reasons for wanting to know the fetal sex that scored the highest percentage for being very important were 'curiosity' (77.8%), 'just want to know' (68%), and 'because it is possible' (66.8%). The most common very unimportant factors for wanting to know fetal sex were 'sex preference' (81.1%), 'preparing older siblings' (73.5%), and 'emotional attachment' (72.2%). The two most common reasons noted as very important for not wanting to know the fetal sex were 'surprise at birth' (93.9%) and 'it is more fun not knowing' (91.7%). 'Does not matter' (75%), 'just want to know' (60%), and 'my partner does not want to know' (53%) were also cites as very important reasons not to know. There was no data collected in this study regarding cultural mores or the desire/expectation for take home keepsakes.

Pregnant women have varied expectations about second trimester ultrasound screening in general. These expectations may be changed by the preparation they get from the ordering physician and the results gained from the ultrasound examination. Most of the investigation in this area particularly regarding routine ultrasound has been carried out in Europe where women equate the ultrasound with finding out about the health of the fetus and usually receive preparatory information about the purposes of screening ultrasound. In 2000, Larsen et al published a study where questionnaires were given to 500 consecutive unselected pregnant women between 16 and 20 weeks during a screening ultrasound visit.[14] Four hundred and ninety-three women participated. Seventy percent of the women had undergone ultrasound examination previously. Ninety percent reported they had received information regarding the purpose of the ultrasound from the obstetrician/family doctor, hospital, or both. The most commonly cited expectation was to confirm heartbeat and fetal movements (47%) followed by confirm baby is alright and or well grown (34%), to exclude malformations (33%), to confirm due date (20%), to identify gender (16%). Five percent of the answers were not legible. Four percent cited they expected to get a picture. One percent cited curiosity. One percent cited to increase the paternal bond and one percent cited that they had no expectations. On an analog scale from 0 (bad) to 10 (good) the majority of women indicated that the ultrasound experience was good (score 8 and above) as did the partners. Less than 1% of the women and 5% of the partners indicated the experience was bad. Ninety-six percent of the women reported that their expectations were fulfilled. Eighty-nine percent indicated that the examination made them feel more secure. Only 4 women (<1%) indicated that the examination made them feel more insecure. The number of women whose fetuses were diagnosed with an anomaly or had abnormal screening test results was not reported.

Similar findings were obtained in another study by Ohman et al. Investigators obtained data on 3061 pregnant women in a nationwide pregnancy sample who completed questionnaires at a mean of 16 weeks about expectations of routine second trimester ultrasound. A second questionnaire was completed 2 months after delivery by 2730 women. The average age was 29.4 years. The majority of women were under 25 years old, were married or cohabitating, and were born in Sweden. Twenty-three percent had a previous miscarriage or stillbirth. Fifty-seven percent were multiparous. Ninety-nine percent of women planned to undertake the routine ultrasound examination between 14 and 20 weeks. During each pregnancy a mean of 2.5 ultrasound examinations were performed during pregnancy. The Swedish national rate from 1996 was an average of 2.1 examinations. Ninety-one percent said the screening ultrasound results were normal and 0.5% said there might be something wrong with the baby. The most common expectation was confirmation of normalcy (86%) followed by confirmation of pregnancy reality for the mother and or father (33%). Twenty-six percent expected to get specific information about the baby: due date (17%), number of babies (9%), sex of baby (4%), and placenta location (1%). Eight percent had expectations of a positive event: to receive good information (4%), have an exciting/joyful experience (3%), to receive a picture or film of baby (2%).

Two months after birth, most of the women said they received enough information about why and how the examination was performed (88%). Fifty-two percent felt they had received insufficient information about potential risks associated with the examination although the perceived risks were not described. Pregnant women in Sweden are routinely provided nationwide written literature about the known safety of ultrasound. Ninety-four percent of women responded that the ultrasound experience was positive. Responses were positive statements about the health of the baby, such as to 'confirm baby is healthy' instead of negative responses, such as 'to make sure nothing is wrong with baby'. Six percent of women reported a non-positive experience. They had a more negative attitude to examination at baseline, were more often single, were of non-Swedish background, were less educated, had more depressive symptoms, had more worry about the health of the baby, and had more critical life events prior to pregnancy. Nulliparas were more positive than multigravidas.

Regarding anxiety levels, women with normal screening ultrasound results have lower anxiety scores after ultrasound compared with before ultrasound. Zlotogorski et al analyzed 183 women who had normal ultrasound examinations. Before the ultrasound, the women were surveyed regarding anxiety, behavioral style, and self-control. After the ultrasound, the anxiety survey was repeated. Participants were given printed ultrasound results and complete explanation of the ultrasound results were offered. Women who had underlying high anxiety states/personalities had little no change in anxiety level after a normal ultrasound. The optimal benefit was experienced by women who sought out information and had higher cognitive resources and informational coping styles. Neither weeks of gestation nor previous ultrasound experience decreased anxiety levels. Interestingly, the amount of feedback provided during the ultrasound did not seem to be critical. The information critical to anxiety reduction was a minimal and simple statement that the fetus looks normal.[15]

The relationship of a mother and her child begins during pregnancy with both realities and fantasies regarding the developing fetus.[16] Although bonding was not commonly cited by women as an expectation of ultrasound in the previous described survey studies, some investigators have linked routine two-dimensional sonography (2D US) with maternal-fetal bonding and positive health behaviors.[17-19] Three-dimensional ultrasound (3D US) has also been reported to promote fetal-fetal bonding and produces images that are more easily recognizable to laypeople. In a study by Ji et al, 50 mothers who had 2D and 3D US and 50 mothers who had 2D US only were interviewed by telephone one to 24 months after birth using a standardized questionnaire. All mothers had normal fetal ultrasound examinations. Mothers who received 3D US ultrasound showed their ultrasound images to more people (median 27 people) than mothers who received 2D US alone (median 11 people). Eighty-two percent of women who received 3D US had a greater tendency to form a mental picture of the baby post-examination compared to 39% of the women who received only 2D US. Women who had a 3D US examination scored higher than those having a 2D US alone for all categories of maternal-fetal bonding.[20]

The expectations for women undergoing ultrasound when something is wrong or the pregnancies are high risk are different than those undergoing screening ultrasound. The previously cited literature supports the fact that most women expect to hear that the fetus is normal after an ultrasound. A diagnosis of bad news or perceived bad news has potential for severe parental stress. Leithner et al interviewed 77 consecutive unselected women with mean age 28.6 years who were referred to a specialized ultrasound center for suspicion of a fetal anomaly, amniocentesis, or chorionic villus sampling for advanced age. The first interview took place after the ultrasound. Another interview took place 6 months after the first survey. Complete data were available from fifty-nine women. After ultrasound scanning or invasive procedures, five groups were identified. Fetal malformations (51%), genetic disorder diagnosed by invasive procedure (12%), other sonographic problem like oligohydramnios, growth restriction, or abnormal nuchal translucency (31%), intrauterine fetal death (5%), and feto-maternal hemorrhage (1%). Thirty-four women elected termination of pregnancy, seven had stillbirth, and thirty-six had a livebirth.

Mood and anxiety scores were found to be comparable to those of patients with a major depressive episode. There was no one problem of the five that showed worse scores than another. Women who lost their child had worse mood and anxiety scores than those who had a live birth. Anxiety scores returned to normal population baseline at the 6 month follow-up interview for all five groups. Mood scores improved, but remained worse than the normal population at the 6 month follow-up interview.[21]

Delivering bad news to a patient is something that most clinicians feel unprepared to do.[22] Pregnant women do have preferences about how bad or uncertain news is delivered. Seventy-six women who received news of a pregnancy abnormality completed survey questions regarding four specific areas of news delivery: quality, speed, environment, and behavior of information-giver.

Women were included if there was a major anomaly, fetal death, minor anomaly, or soft markers for aneuploidy. Women valued immediate, clear information with different options explained, enough time to ask questions, information about follow-up care, privacy, and the sympathy of the person giving the bad news. Women valued to a lesser degree that the information giver be sitting, that a physician deliver the news (even if there is no previous relationship), a support person be present, and inquiry about need for help to get home. Regarding reference to the unborn as a baby or a fetus, a significant number felt strongly that the provider use the word baby when giving bad news. A smaller number felt it was important to hear the word fetus. In both cases, the minority of women considered the terms to completely unimportant.[23]

After interviewing 13 women who received unexpected news during an ultrasound, another investigator found similar maternal expectations; particularly, that results be provided clearly by a physician.[24] Long silences, nonverbal cues from examiners, and multiple examiners were unexpected. The practice of being sent back to the referring physician to get the results was perceived as deceitful and evasive. The author provided the following suggestions for improving a woman's ultrasound experience. Before beginning the examination women should be informed that:

- While most prenatal ultrasounds are normal, sometimes unusual appearances can be seen and may require detailed and lengthy checking by a second provider so there may be more than one provider in the room.
- Ultrasound examination may involve position changes of both body and ultrasound screen.
- Ultrasound examination may reveal an unexpected finding in the fetus.
- The sonographer is unable to give results of the ultrasound examination.
- A diagnosis based on the ultrasound findings can be made only by a physician.

The disclosure of ultrasound soft markers for aneuploidy has created controversy within the specialties of obstetric ultrasound and maternal fetal medicine. There is evidence that identification of soft markers can be profoundly distressing for pregnant women and can do harm.[25,26] Many women perceive that the disclosure of a soft marker leaves them with impossible choices and a dilemma or crisis that must be solved. The presence of soft markers can lead many women to 'put the pregnancy on hold' while waiting for results of diagnostic testing. Continued anxiety or worry after normal invasive test results persists in 13 to 60% of women.[27,28]

This phenomenon is illustrated well in a story recounted in a letter written by Drs G Mason and C Baillie to the British Medical Journal in 1997. A couple were referred for amniocentesis during a second pregnancy on the grounds of maternal age (35 years) and anxiety. Their 3 years old son was present and appeared normal. When his wife had left the room after the procedure, the husband confided that they had opted for amniocentesis to avoid having another brain damaged child. It became apparent that an ultrasound examination before their son's birth showed a choroid plexus cyst, but despite having a healthy child, the husband remained convinced that this cyst would cause his son to be disabled… It is not easy to convey to couples the idea that an indicator of abnormality that can be visualized is probably consequential… Such cases have led us to stop reporting isolated choroid plexus cysts in the fetuses of younger women as we believe the anxiety far outweighs the potential gain'.[29]

Many ultrasound and maternal fetal medicine experts advocate not disclosing isolated soft markers, such as the echogenic intracardiac focus (EIF) or the choroid plexus cyst (CPC) in low risk women.[30] Others insist that there is an obligation to inform women of all findings, calculate revised risks with likelihood ratios, counsel extensively, and allow women to decide for themselves whether or not to have an invasive procedure.[31] Interestingly the paper advocating non-disclosure was signed by 18 additional experts several of whom have published original research in the area of soft marker identification. The paper advocating disclosure was written by experts who declined to be a signatory on the first paper.

Women's expectation of ultrasound when planning abortion is a rarely investigated area in ultrasound literature. Opponents and supporters of abortion services have sought to control women's experience of ultrasound viewing in the context of abortion care. Abortion rights opponents have implemented laws regulating the provision of ultrasound, including mandating that patients be offered the opportunity to view their ultrasound or, in a few states, that women be required to view the image. Prolife political movements perceive that women who 'see the baby' will be less likely to terminate the pregnancy. Others who support abortion rights discourage viewing based on their concerns about the potential negative emotional impact and or feelings they will be perceived as subtly trying to get women to change their minds. Approximately 25 to 45% of women who seek abortion services choose to view the ultrasound images. Factors associated with increased odds of wanting to view are low decision certainty, nonwhite race, age less than 25 years, and being below poverty

level. Choosing to view also depends on how often viewing is offered. Ultrasound viewing does not appear to have a singular emotional impact. The most common emotional response in women who underwent abortion and who viewed the ultrasound images was neutral ('fine, nothing') followed by negative ('sad, guilty'). The least common response was positive ('happy, excited'). Authors of work on the subject advocate that providers should consider offer viewing opportunities in order to cater to individual patient desires. Mandatory viewing is coercion and is not recommended.[32,33]

What do Doctors recommend Regarding Obstetrical Ultrasound?

The American Institute of Ultrasound in Medicine (AIUM) practice guideline indicates that certain key elements be executed when performing an obstetric ultrasound.[34] The AIUM document focuses on quality and safety. It does not discuss current procedural technology (CPT) ultrasound codes and requirements for ultrasound billing which demand a different set of criteria to appropriately bill for services. These differences may cause significant confusion for providers and coders.

According to AIUM, there must be a written request for the examination that contains an indication or other pertinent healthcare information that is consistent with legal and local healthcare facility requirements. The persons performing and interpreting the images must be qualified, and there must be permanent documentation of the examination including a report and labeled images. As low as reasonably achievable (ALARA) principles should be followed. The procedure should be performed only when there is a valid medical indication and examination time should be limited to what is medically necessary. Thermal indices should be set appropriately low and spectral Doppler usage is discouraged in the first trimester.

First trimester examinations must include evaluation of the presence, size, location, and number of gestational sacs (GS). The GS is examined for presence of the yolk sac and embryo/fetus. If an embryo/fetus is present it should be measured and cardiac activity documented by m-mode or video clip. Maternal structures, uterus, cervix, adnexa, and culdesac should be examined. Standard second or third trimester examinations include evaluation of fetal presentation, amniotic fluid volume, cardiac activity, placental position, fetal biometry, fetal number, plus anatomic survey. The maternal cervix and adnexa should be examined as clinically appropriate when technically feasible.

A specialized (detailed) examination is described as a detailed examination performed when an anomaly is suspected on the basis of history, biochemical abnormalities, or the results of either the limited or standard scan. Others specialized examinations might include fetal Doppler ultrasound, a biophysical profile, a fetal echocardiogram, and additional biometric measurements.

The anatomic survey represents the minimal elements of a standard examination and includes the following: Head face and neck (lateral ventricles, choroid plexus, midline falx, cavum septum pellucidum, cerebellum, cisterna magna, and upper lip), Chest (four chamber view, left and right ventricular outflow tracts), Abdomen (stomach size and situs, kidneys, bladder, abdominal umbilical cord insertion site, umbilical cord vessel number), Spine (cervical, thoracic, lumbar, and sacral), Extremities (legs, arms), and sex in multiple gestations and when medically indicated. The document does not elaborate on the exact key anatomy elements of a detailed examination that should be covered above and beyond the minimal elements previously listed. The 76811 Task Force Consensus report does provide detailed guidance about what anatomy needs to be covered in a specialized (detailed) second or third trimester obstetric ultrasound examination. Again, this is not identical to the 76811 CPT description. The examination should be performed by a provider with specialized training, it should only be performed once in a pregnancy, and must be indicated by suspected fetal abnormality, known fetal growth disorder, genetic abnormality, or increased risk of a genetic or anatomic abnormality.[35]

Ultrasound performed for pure entertainment purposes only is strongly discouraged and is not supported by major leadership organizations in obstetrics in gynecology and ultrasound. The American Institute of Ultrasound in Medicine, the American Congress of Obstetricians and Gynecologists, the International Society of Ultrasound in Obstetrics and Gynecology have all come out with statements against non-medical use of obstetric ultrasound. The US Food and Drug Administration considers the promotion, selling, or leasing of ultrasound equipment for making 'keepsake fetal videos' an unapproved use of a medical device. Use of a diagnostic ultrasound system for these purposes without a physician's order may be in violation of state laws or regulations.[34,36,37]

Obstetric ultrasound has an excellent safety record and patients are well aware of this fact. The demand for fetal pictures and videos has not slowed down just because doctors and medical organizations do not advocate it. If the ultrasound doctor would not give out images after an indicated ultrasound, the one down the street probably will, or the non-medical ultrasound store will happily oblige for a fee. The market for keepsake

images may have increased because patients may think doctors have something to hide or are trying to protect themselves against lawsuits by refusing to give out images. The answer lies somewhere in-between. The AIUM acknowledges the pressures from patients for the performance of ultrasound for bonding purposes. This demand is largely driven by the common knowledge of the existence of 3D ultrasound, the commercialization of easily recognizable 3D fetal images, and the expectation to be able to share these images directly or on social media.

The AIUM amended its policy on keepsake images in 2012. This included recommendations that 'it is acceptable and encouraged to give images or video clips to parents during the course of a medically indicated ultrasound.' American Institute of Ultrasound in Medicine acknowledged that sharing images with patients is unlikely to have a detrimental mediolegal impact although this area needs further analysis. Furthermore, added cost arrangements are not condoned and violates the principles of medical ethics of the American Medical Association.[38]

Unfortunately, the AIUM statement does not clarify what kinds of images are acceptable. Keeping copies of media given to patients is prudent and sounds simple. This is hard to do when the family creates their own image or video from a hand-held device or phone that the sonographer may or may not be aware of. There are currently no guidelines about how to address larger and larger demands by patients who come in for indicated ultrasound. There are many unanswered questions. How many pictures? Pictures of what? Who gets a picture, video, disk, or all of the above? How long does the provider spend to get the perfect image? What to do if the patient does not like the image and asks for another one or another type of image? Does everyone get 3D images in any trimester and how long to we spend taking them and potentially post processing them to make sure they are not scary to patients? What to do if the patient asks for the entire examination? Even more complicated are the requests to capture the entire experience on tape or cell phone video, to invite other observers in by Skype or Facetime, or to call cake decorators and party planners to report the gender of the fetus. Recommendations for controls on keepsakes from indicated ultrasounds are desperately needed.

In summary, patients and physicians are coming to an ultrasound examination with diametrically opposed goals. Women come to obstetric ultrasound with the primary expectation to hear the simple news that their baby is normal and most wish to know the fetal sex as a secondary piece of information. They would also like to have information ahead of time about what to expect from an ultrasound examination experience. Ultrasound physicians are charged with the task of identifying something wrong, providing a definitive diagnosis, and communicating it in a balanced and relatively unemotional manner, while at the same time being beneficent and respectful of patient autonomy. Patients may not want to find out that something is wrong, but when there is, they want direct, compassionate communication, and a plan of action. Physicians want to avoid 'wrongful birth' for patients and for themselves, but at the same time must not coerce women to have diagnostic procedures or be perceived to have caused 'wrongful pregnancy loss'.

Uncertainty causes great anxiety making identification of soft markers difficult for both physicians and patients and experts cannot agree about whether to disclose certain markers. Conducting a fetal ultrasound has been likened to 'walking blindfolded in tiger country. It can never offer complete certainty whilst any hint of uncertainty may have devastating effects on expecting parents.'[39] Medical literature indicates that women do not come to an obstetric ultrasound for the express purpose of getting keepsake images, but it is now expected by ultrasound experts and patients that keepsake images be given as part of an indicated examination.

In the 1950s, when Ian Donald first applied a sonar device to see a fetus in gestation, he probably did not envision the journey that obstetric imaging has taken to bring the doctor patient relationship closer together or farther apart. We have much to learn about the strengths and weakness of ultrasound technology and its effect on the human experience.

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