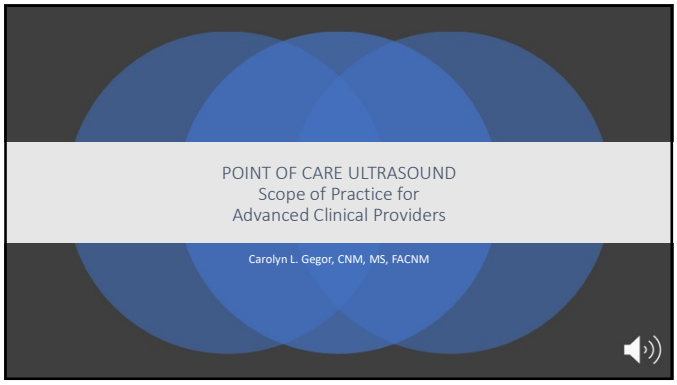


Point of Care Ultrasound

- Major change in delivery of ultrasound services
- Led by Emergency Room providers
- Now recognized as a subset of ultrasound studies
- Midwives are leading the way in Ob/Gyn

Focus Pocus

- Focused on a specific clinical issue
- Information needed for rapid decision making
- Bedside use of ultrasound exams by trained providers
- Not intended to be full-scope scanning

Standard Setting Documents

- AIUM "*Practice Parameter for the Performance of Limited Obstetric Ultrasound Examinations by Advanced Clinical Providers*"
- ACNM "Position Statement. Ultrasound in Midwifery Practice"
- ARDMS "Midwife Focused Sonography Content Outline"

American Institute of Ultrasound in Medicine (AIUM)

"AIUM Practice Parameter for the Performance of Limited Obstetric Ultrasound Examinations by Advanced Clinical Providers" J Ultrasound Med 2018; 37:1587-1596.

https://www.aium.org/resources/guidelines/LimitedOB_Providers.pdf

"Training Guidelines for Advanced Clinical Providers in Women's Health Performing and Interpreting Limited Obstetric Ultrasound" AIUM Official Statements 3/25/2018

https://www.aium.org/resources/viewStatement.aspx?id=70

Includes WHNPs, PAOGs, CNM/CMs

Point of Care Ultrasound

Setting Our Scope of Practice

- Scan for normal female reproductive anatomy
- Scan for pregnancy identity and viability
- Dating ultrasound in each trimester
- Evaluation of fetal growth in 2nd and 3rd trimesters
- Evaluation of fetal well-being in the 3rd trimester

AIUM "Practice Parameters"

"A limited obstetric ultrasound exam may be performed in an acute clinical situation when an immediate impact on management is anticipated: …evaluation of fetal cardiac activity or presentation in a laboring patient.

…may also be performed in patients requiring serial exams in which a subsequent anatomic evaluation is unnecessary or impractical."

AIUM "Practice Parameters"

"If not previously performed during the index pregnancy, a standard diagnostic or detailed …exam should be performed as soon as reasonably possible after the limited ultrasound examination.

Incidental findings of potential clinical significance should prompt consultation with a physician who at minimum meets AIUM…..Guidelines."

Position Statement

Ultrasound in Midwifery Practice

It is within the scope of midwifery practice for certified midwives/certified nurse-midwives (CM/CNMs) to perform ultrasound examinations.

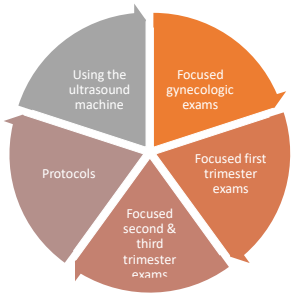
Performance of ultrasound exams can be incorporated into midwifery practice by following the Standards for the Practice of Midwifery which delineates the requirements for expanding midwifery skills beyond those outlined in the Core Competencies for Basic Midwifery Practice.

Position Statement

- Basic gynecologic ultrasound may be used to recognize the normal uterus and ovaries and common variations of normal.

- Endometrial stripe
- Location of an IUD
- Recognition of pelvic masses
- Assisted reproductive techniques

ARDMS Midwife Certificate Exam



Obstetric indications for a full-scope ultrasound exam

- Any pregnant woman who has not had a full scope scan previously
- Early pregnancy loss
- Ultrasound results suspicious for an ectopic or molar pregnancy
- Twin gestation
- Any indication of a fetal anomaly
- Indication of poor fetal growth pattern

Gyn indications for a full-scope ultrasound exam

- Evidence of an abnormal endometrial stripe
- Evidence of a pelvic mass
- Abnormally placed or absent IUD

Documentation of ultrasound results

- An order for the exam including specific indication(s) with clinical scenario should be documented
- Components of an ultrasound report
  - Permanent record of report and images
- Requirements to be able to bill for this service

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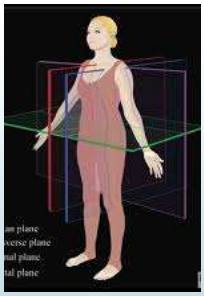
Cross Sectional Anatomy

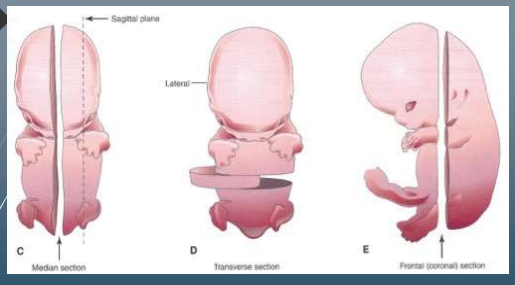
Carolyn L. Gegor, CNM, MS, FACNM

Scanning planes

- *Red = Longitudinal plane*
- *Blue – Sagital plane*
- *Green = Transverse plane*
- *Purple = Coronal plane*

www.nysora.com





Moore, page 13

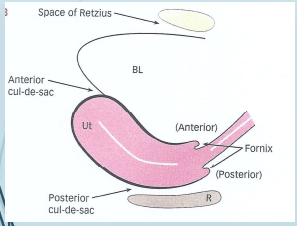
Longitudinal Scanning

Abuhamad, p. 50

Transverse Scanning

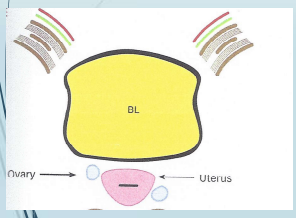
Abuhamad, p. 52

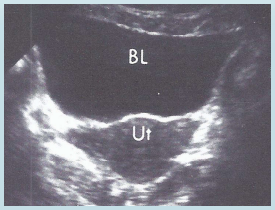
Normal Uterus, Transabdominal Longitudinal Scan



Gill, p. 31 *Gill, p. 5*

Cross Sectional Anatomy
Transverse Scan





Gill, p. 31

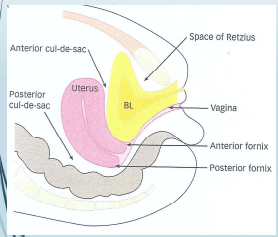
Transverse Transabdominal Scan

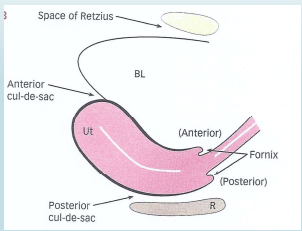
Right

Left

Gill, p. 4

Effect of Bladder Fullness





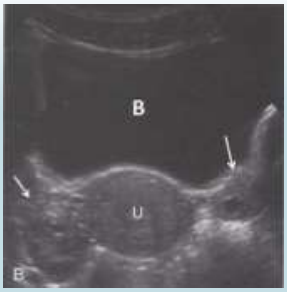
Gill, p. 31

Normal
Anteverted Uterus

Transabdominal,
Longitudinal

Normal Uterus/
Ovaries

- Transverse Scan
- Transabdominal



Norton, p. 846

Transvaginal Scanning

Abuhamad, p. 310

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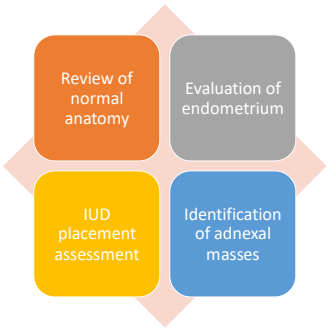
Gynecologic Ultrasound

Carolyn L. Gegor, CNM, MS, FACNM

Indications for Gyn Point of Care



Scope of Practice

- ACNM Position Statement, "Ultrasound in Midwifery Practice"
  - Basic gynecologic ultrasound may be used to:
  - recognize normal uterus and ovaries
  - measure the endometrial stripe
  - location of an IUD
  - recognition of pelvic masses

Scope of Practice

- American Registry for Diagnostic Medical Sonographers (ARDMS). Midwife Certification Examination.
  - Assess and record uterine position, depth, width and length
  - Assess both adnexa
  - Measure the endometrium in anterior and posterior diameter
  - Assess the anterior and posterior cul-de-sacs
  - Identify IUD placement
  - Identify ovarian cysts and masses
  - Use and identify indications for transabdominal vs. transvaginal scans

Gyn overview

- Indications for transabdominal scanning
  - Determine uterine size and position
  - Determine if TV scanning would provide improved imaging
- Indications for use of transvaginal scanning
  - Desire for the best image resolution
  - Inability to obtain a quality image with transabdominal scanning
  - Retroverted uterus
  - Assessment of ovarian follicles
  - Maternal obesity

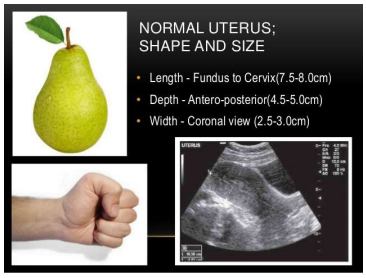
Transvaginal Scanning

Advantages	Disadvantages
Shorter probe to target distance	Cost
Uses higher frequency probes	Limited depth penetration
Better image resolution	Lacks global picture
Earlier diagnosis of fetal viability/ectopic preg	Difficult to evaluate large masses
Useful for retroverted uterus	Relatively invasive
Useful for obese patients	

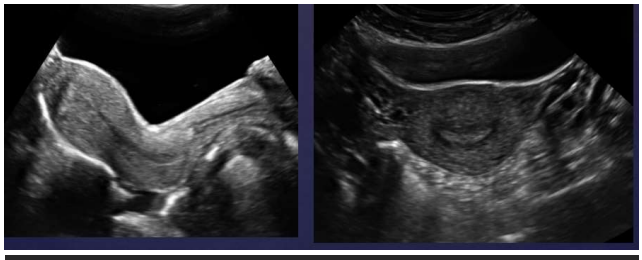
Gyn Overview

- Assess and record uterine position
- Measure depth, width and length of the uterus
- Assessment of the adnexae
- Identify and measure ovaries when possible

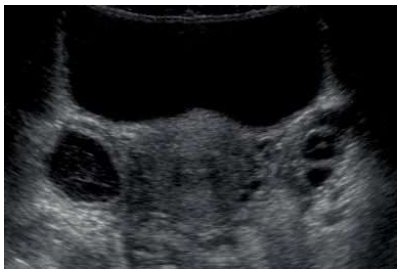
- NORMAL UTERUS



R. Ramie, Basic gynae ultrasound. Slideshare.net. 1/20/2014

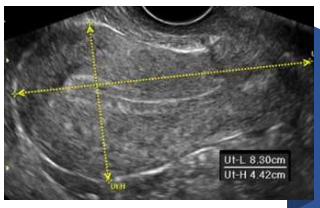


Normal anteverted uterus



Uterus & ovaries

Ultrasoundpaedia.com. Ultrasound of the uterus – normal.



Normal Uterus Transvaginal scan

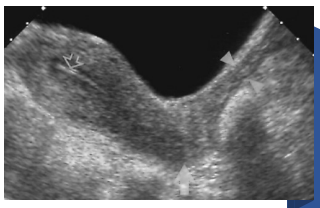
Sagital section

Normal Uterus Transvaginal scan

Coronal Section

Anteverted Uterus

Norton, p. 851



Anteverted Uterus

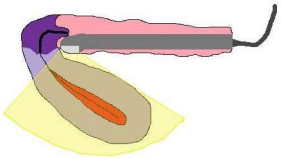
Retroverted Uterus

Norton, p. 852

Retroverted Uterus

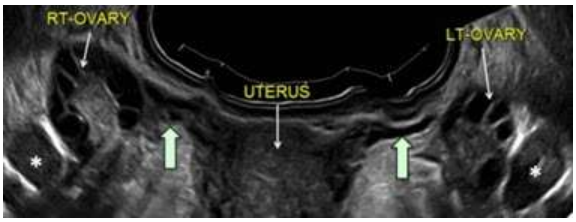
Retroflexed Uterus

Norton, p 851

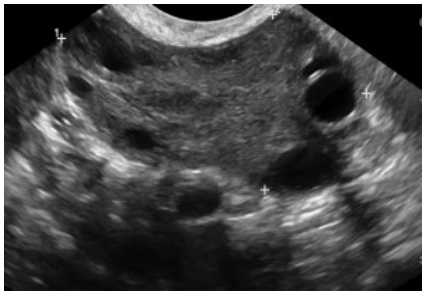


Ultrasoundpaedia.com

Retroflexed Uterus, Transvaginal Technique



- Full Pelvic View



Normal ovary with follicles

Normal ovarian follicle near rupture

Radiologykey.com. A study of follicle at the time of ovulation: A comparative sonographic study.

Gyn Overview

- Assessment of the endometrium
- Identification of endometrial fluid
- Measure the endometrium in the anteroposterior diameter

Normal Proliferative Endometrium

- Early Proliferative,
- 5 days
- 1-2 mm

Norton, p. 824

Normal Proliferative Endometrium

- Late proliferative
- Periovulatory
- 12-13 mm

Norton, p. 824

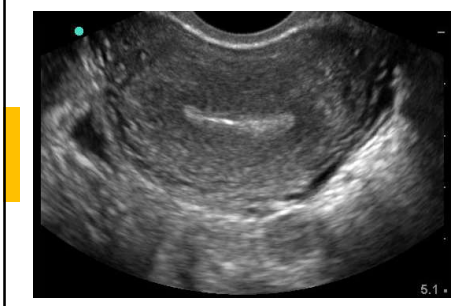
Normal Secretory Endometrium

- Usual measure 16-18 mm

Anatomylibrary99.com

Normal secretory phase

Tyagi. Is pregnancy possible with normal endometrial lining in follicular study? Youtube.com



Normal Coronal View

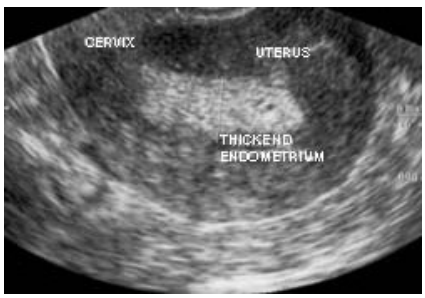
Normal Postmenopausal Endometrium

- Normal 1-2 mm
- May be up to 4-5 mm if bleeding
- > 4-5 mm consider endometrial hyperplasia

Norton, p. 825

Normal Endometrium w fluid

Doubilet. Post-menopausal bleeding. Radiologykey.com



Endometrial hyperplasia

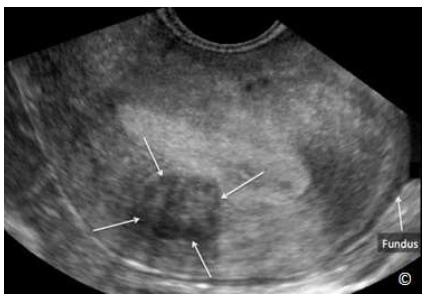
8.2 mm

Wellbeingforwomen.com. Endometrial polyps. 9/20/2014.

Thickened endometrium post-menopausal

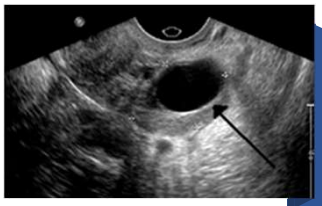
Assessment of Pelvic Masses

- Uterine fibroids
- Ovarian Cysts
- Complex masses
- Assess the Posterior cul-de-sac



Intramural Uterine fibroid

Subserosal fibroid



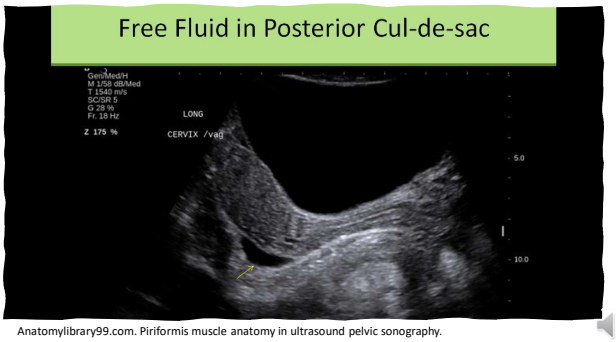
2 cm left ovarian cyst

Heilman. 8/29/2011. https://Wikipedia.org.

PCOS

Kushner-Davalos. 2011. Polycystic ovary, transvaginal ultrasound 3th day of period clinical signs of insulin resistance.

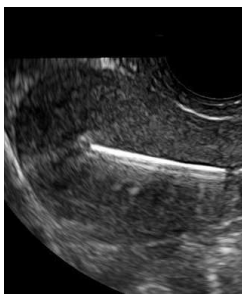
Free Fluid in Posterior Cul-de-sac



Anatomylibrary99.com. Piriformis muscle anatomy in ultrasound pelvic sonography.

Gyn Overview

- Identify presence and placement of an IUD



Normal IUD in sagittal plane

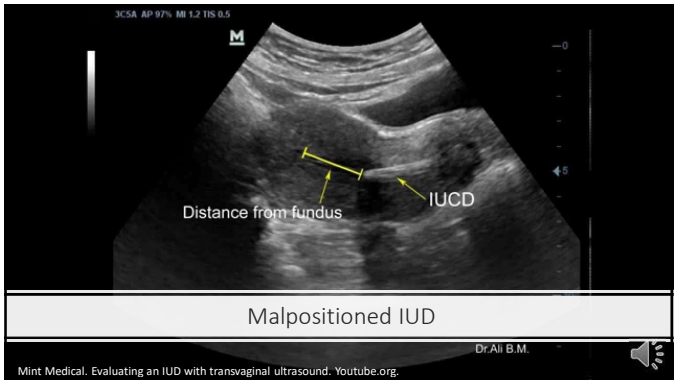
Hootsuite. Expert overview on using ultrasound to zero in on an IUD. Contemporary OB/Gyn. 12/08/2016.

Normal stem of IUD

Haggstrom. Wikipedia.org. 6/23/2014.

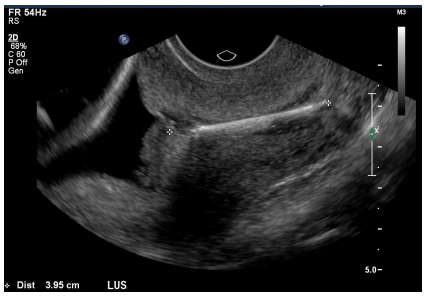
IUD in posterior myometrium and cervix

Ovel. Localize intrauterine device. Radiologykey.com.



Malpositioned IUD

Mint Medical. Evaluating an IUD with transvaginal ultrasound. Youtube.org.



25 y/o amenorrhea and pelvic pain. IUD in cx, fetal head to left

Radiologypics.com. Intrauterine device in cervix. 1/20/2013.

Summary Point of Care Gyn

- Review of normal anatomy
- Evaluation of endometrium
- IUD placement assessment
- Identification of adnexal masses

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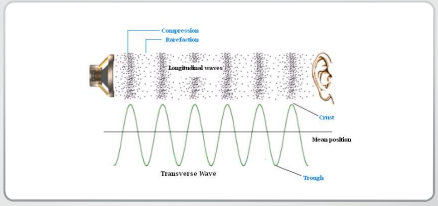
Physics of Ultrasound

Carolyn L. Gegor, CNM, MS, FACNM

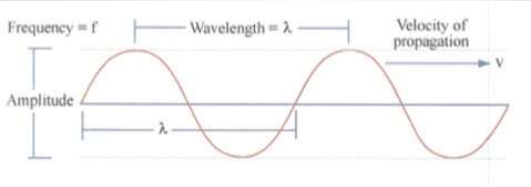
Overview

- What is sound; ultrasound?
- Functions of sound in human tissue
- Anatomy of the transducer; transducer types
- Image types
- Instrumentation
- Bioeffects
- Epidemiology



What is Sound?

Sound Waveform

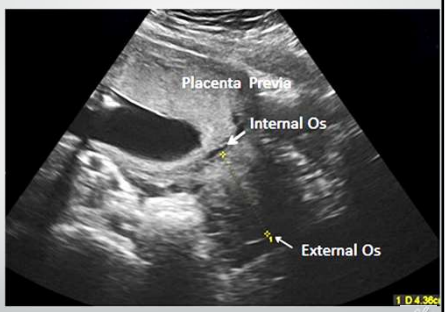


Shah A. Univ. Cincinnati, Division of EMS.

Frequency = Cycles per Second

- Hertz (Hz) 1Hz = 1 cycle per second
- Megahertz (MHz) = One Million Hz
- Audible between 20 Hz to 20 KHz
- Ultrasound > 20 KHz
- OB Ultrasound 2 to 10 MHz
- Medical Ultrasound 1-20 MHz

Lower Frequency = **Increased** Penetration and **Decreased** Resolution



Ultrasoundcare.com.au

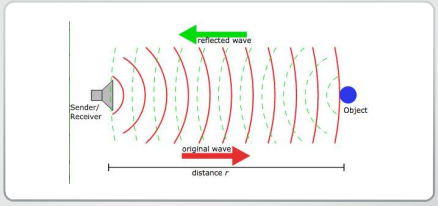
Higher Frequency
=
Decreased
Penetration and

Increased
Resolution

Ultrasoundcare.com.au

Velocity of Propagation in Tissue

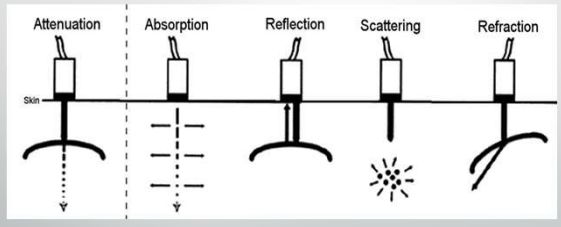
Tissue Type	Speed in M/Second
Air	330
Fluid	1430
Muscle	1580
Fat	1450
Blood	1570
Bone	4080
Average soft tissue	**1540**



Reflection

Shah A. Univ. Cincinnati, Division of EMS

Function of Sound in Tissue

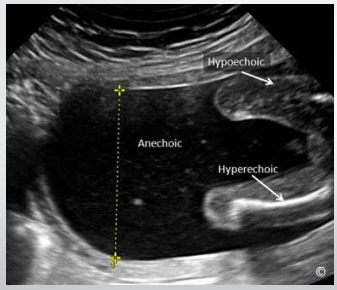


DeWilde, D.

Echogenicity Terms

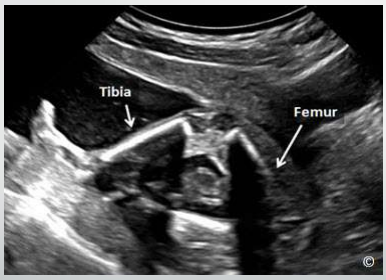
- **Anechoic** – No echoes seen. Appears black, esp. simple fluid, has strong posterior definition and through transmission
- **Hypoechoic** – Has fewer echoes than more solid surroundings,
- **Hyperechoic** – Strong echoes, solid, reflective, has no transmission of sound behind it, such as bone or calcified material.
- **Homogeneous** – Uniform in echogenicity
- **Heterogeneous** – Not uniform echogenicity

Echogenicity



Abuhamad A. p. 14

Echogenicity

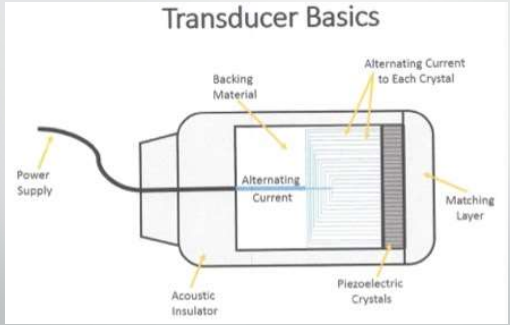


Abuhamad A. p. 15.

Heterogeneous Mass (Ovary w PCOS)

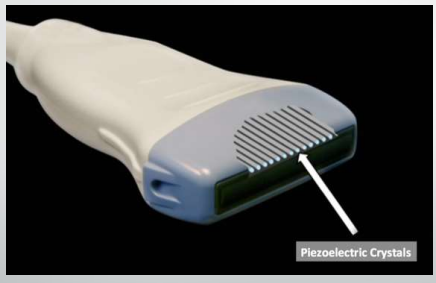
Abuhamad A. p. 276.

Transducer Basics



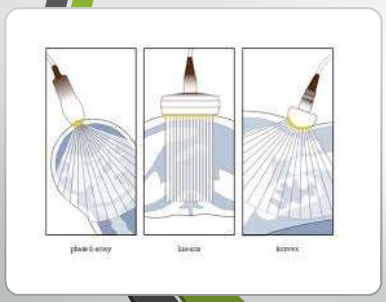
Vaultultrasound.com

Piezoelectric Crystals

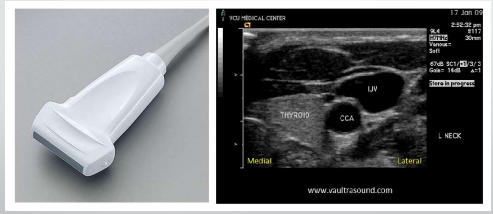


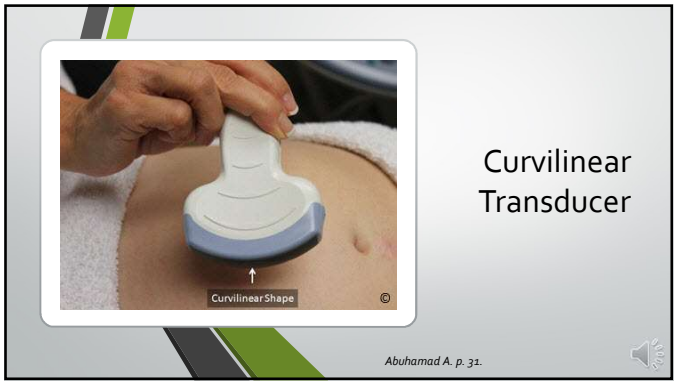
Abuhamad A. p. 13.

Transducer Types



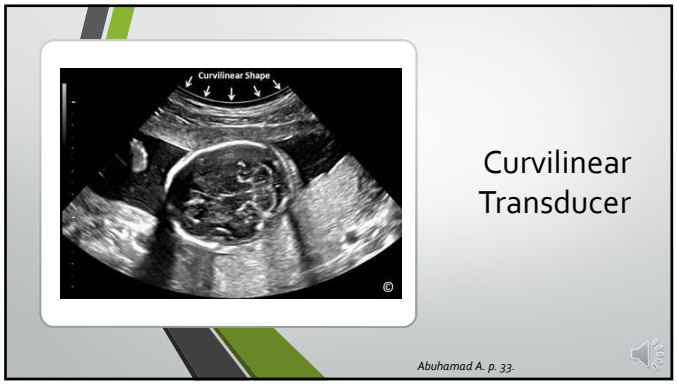
Linear Array Transducer





Curvilinear Transducer

Abuhamad A. p. 31.

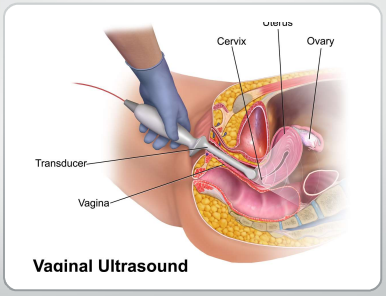


Curvilinear Transducer

Abuhamad A. p. 33.

Sector Scanner

- Small footprint
- Wider field of view



Vaginal Ultrasound

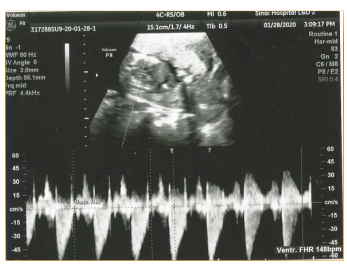
Transvaginal Transducer

- Sector scanner

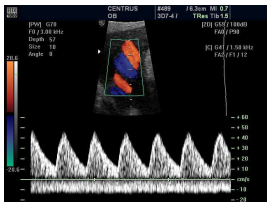
Image Types

- B-Mode — 2 - dimensional gray scale
- M-Mode — Single dimensional, motion modulation
- Color Flow — Pulsed wave doppler ultrasound

2 – D Image/ B -Mode



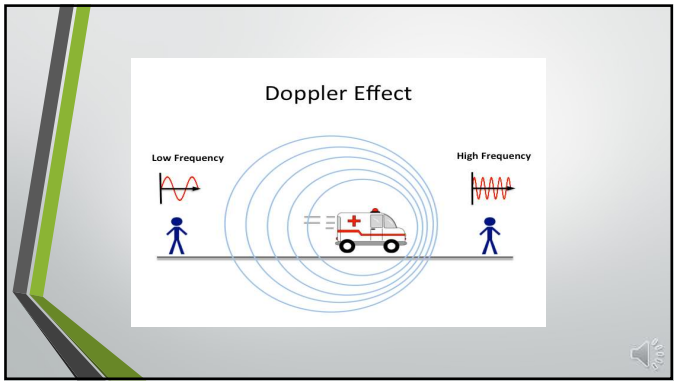
M- Mode

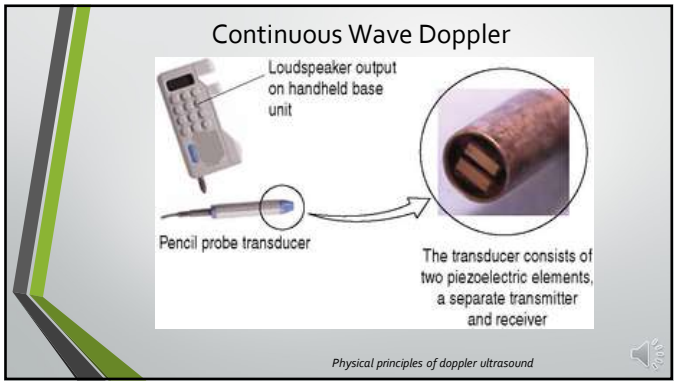


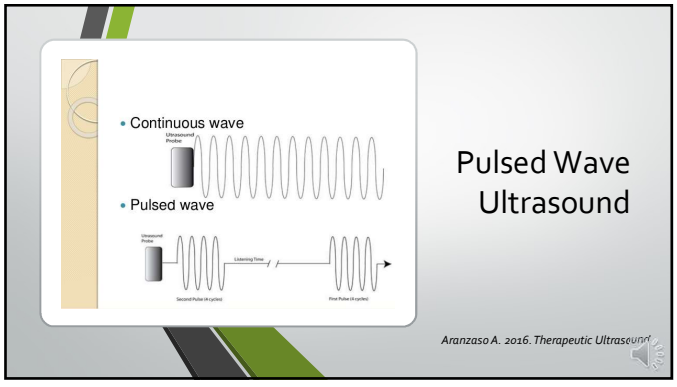
Color Flow/ Doppler Flow

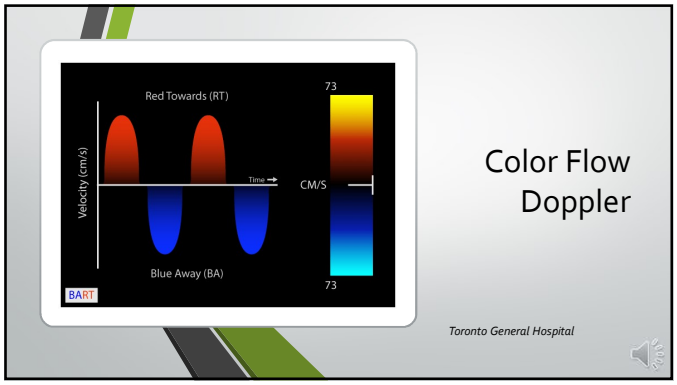
Doppler Effect

- The apparent change in frequency detected when the sound is moving relative to the hearer.


Doppler Effect
Low Frequency
High Frequency

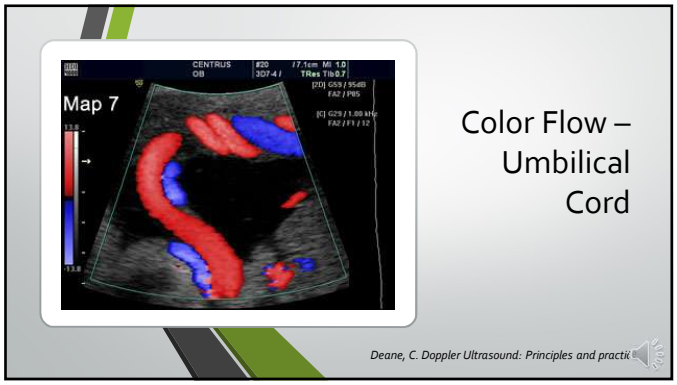

Continuous Wave Doppler
Loudspeaker output on handheld base unit
Pencil probe transducer
The transducer consists of two piezoelectric elements, a separate transmitter and receiver
Physical principles of doppler ultrasound


Continuous wave
Pulsed wave
Pulsed Wave Ultrasound
Aranzaso A. 2016. Therapeutic Ultrasound



Color Flow Doppler

Toronto General Hospital



Color Flow – Umbilical Cord

Deane, C. Doppler Ultrasound: Principles and practi

Care for Your Machine!

- Never:
  - Run over transducer cords!
  - Drop transducers!
  - Hang transducers from non-designated holders
- Always:
  - Clean the transducers and keyboard after every use!
  - Plug the machines in after each use

"Knobology"

"Knobology"

- Track-ball – controls the calipers and other controls
- Set/Measure - Places the calipers for measurement
- Freeze control – saves the image on the monitor
- Print – prints the image on the monitor
- Zoom – allows for greater concentration on a specific area of an image
- Preset controls for specific exams – e.g., 1st trimester, 2nd & 3rd trimester biometry, BPPs

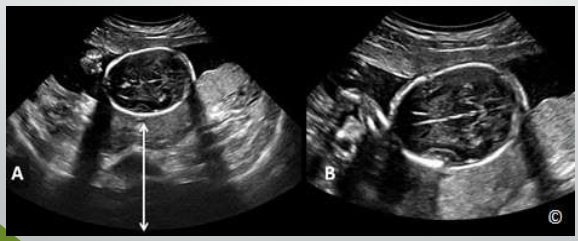
"Knobology"

- Focal Zone
- Gain
- Time Compensated Gain TGC

"Knobology"

- Focal Zone- The depth at which the lines of sound are closest together and resolution is at its best.

Focal Zone

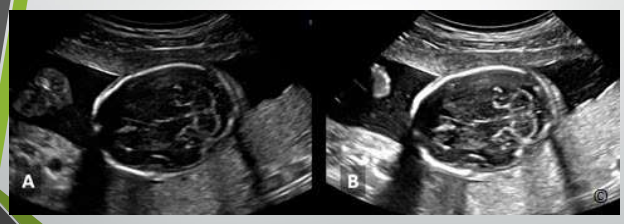


Abuhamad A. p. 36.

"Knobology"

- Gain – The brightness of the image on the monitor.

Gain



Abuhamad A. p. 36.

"Knobology"

- Time Compensated Gain (TGC): A series of sliding levers that adjust the signal amplification at specific depths to compensate for non-linear attenuation of sound.

Bioeffects

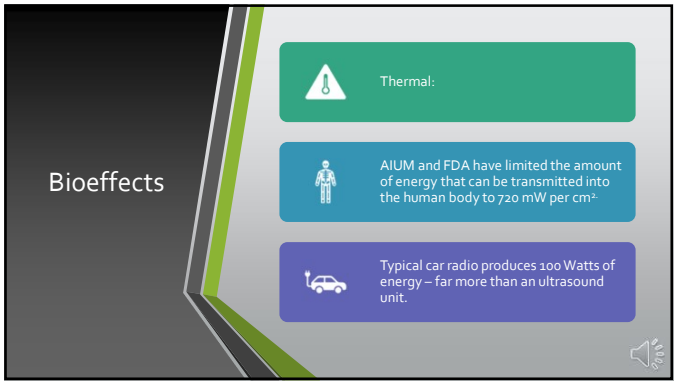
Bioeffects – potential

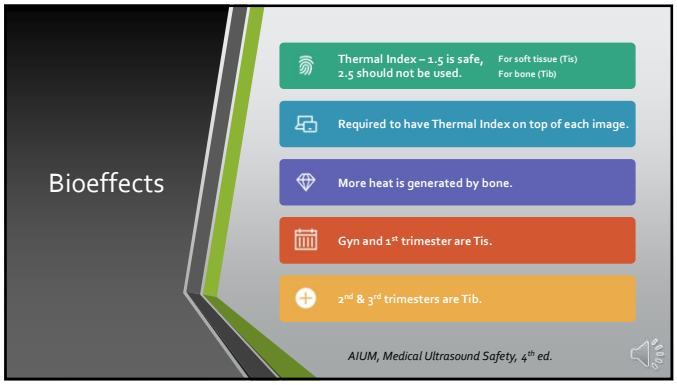
- a. thermal
- b. mechanical - cavitation
- c. AIUM statements regarding safety

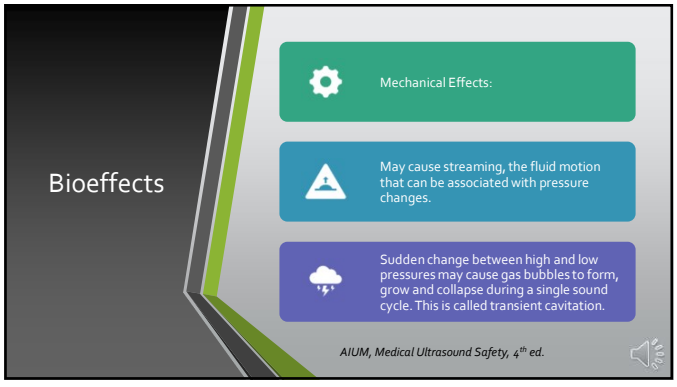
Bioeffects

- Thermal – heat is produced by introduction of sound energy into the body.
- Most of the acoustical energy becomes heat.
- An embryo or fetus is at higher risk than adult tissue.
- Less scanning time decreases exposure.
- Pulsed Doppler increases heat production.
- Single focal zone causes less heat than multiple focal zones.

AIUM, Medical Ultrasound Safety, 4th ed.


Bioeffects
Thermal:
AIUM and FDA have limited the amount of energy that can be transmitted into the human body to 720 mW per cm2.
Typical car radio produces 100 Watts of energy – far more than an ultrasound unit.


Bioeffects
Thermal Index – 1.5 is safe, 2.5 should not be used.
For soft tissue (Tis)
For bone (Tib)
Required to have Thermal Index on top of each image.
More heat is generated by bone.
Gyn and 1st trimester are Tis.
2nd & 3rd trimesters are Tib.
AIUM, Medical Ultrasound Safety, 4th ed.


Bioeffects
Mechanical Effects:
May cause streaming, the fluid motion that can be associated with pressure changes.
Sudden change between high and low pressures may cause gas bubbles to form, grow and collapse during a single sound cycle. This is called transient cavitation.
AIUM, Medical Ultrasound Safety, 4th ed.

Bioeffects

- Mechanical Index (MI) is displayed next to the TI.
- Is a number that expresses the likelihood that cavitation will occur at current settings.
- The lower the number is, the less chance there is that streaming, shearing or cavitation will take place.
- Doppler use should be kept at a minimum.

AIUM, Medical Ultrasound Safety, 4th ed.

Non-Diagnostic Ultrasound

- Discouraged by FDA, perinatal and public health organizations
- Unapproved use of medical device
- When AIUM receives report of U/S for entertainment or non-medical use, it is verified and reported to FDA

American College of Obstetricians and Gynecologists (ACOG) Guidance, 2009

"Ultrasound energy delivered to the fetus cannot be assumed to be completely innocuous, and the possibility exists that such biological effects may be identified in the future. Ultrasonography should be performed only when there is a valid medical indication, and the lowest possible ultrasound exposure setting should be used to gain the necessary diagnostic information under the as-low-as-reasonably achievable principle…

"The use of either two-dimensional or three-dimensional ultrasonography only to view the fetus, obtain a picture of the fetus, or determine the fetal sex without a medical indication is inappropriate and contrary to responsible medical practice." (p. 455-456)

American College of Obstetricians and Gynecologists (ACOG). (2009). *Ultrasonography in pregnancy* (ACOG Practice Bulletin No. 101), p. 456. Washington, D.C.: ACOG

Epidemiology for Obstetric Ultrasound

- **AIUM Official Statement**:
- "Based on the epidemiologic data available and on current knowledge of interactive mechanisms, there is insufficient justification to warrant conclusion of a causal relationship between diagnostic ultrasound and recognized adverse effects in humans. Some studies have reported effects of exposure to diagnostic ultrasound during pregnancy, such as low birth weight, delayed speech, dyslexia, and non-right-handedness. Other studies have not demonstrated such effects.

AIUM. Medical Ultrasound Safety, 3rd ed. 2016.

ALARA Principle

- The potential benefits and risks of each examination should be considered. The ALARA (**A**s **L**ow **A**s **R**easonably **A**chievable) Principle should be observed when adjusting controls that affect the acoustical output and by considering transducer dwell times.
- Further details on ALARA may be found in the AIUM publication *Medical Ultrasound Safety, 4th ed*.

AIUM. As low as reasonably achievable (ALARA principle)

Safety Update 2020

- In more than 6 decades of use, there has been no report of injury to patients or to operators from medical ultrasound equipment. We, in the ultrasound community, want to keep that level of safety.
- Now, more information is available. The MI and TI provide users with information that can be specifically applied to ALARA. …These make it possible for the user to get the best image possible while following the ALARA principle and, thus, to maximize the benefit-to-risk ratio.
- AIUM Medical Ultrasound Safety, 4th ed. P 56.

Congratulations!

You have survived Physics!

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- University of Cincinnati, Division of EMS. Ultrasound physics. How does it work? www.tamingofthesru.com.
- VAULT Ultrasound. Ultrasound Physics. Vaultultrasound.com.

First Trimester Ultrasound

Carolyn L. Gegor, CNM, MS, FACNM

First Trimester Point of Care

- Scope of Practice - AIUM Practice Parameters For Advanced Practice Providers, 2018
- Indications/Criteria for 1st Trimester Scanning
- Early Pregnancy Changes
- Estimated Gestational Age
- Fetal Heart Rate Documentation
- Indications of Pregnancy Failure
- Ectopic Pregnancy/ Pregnancy of Unknown Location (PUL)
- Common Abnormalities

First Trimester Overview

Objectives First Trimester US

- Confirm IUP
- Indications for TA/ TV Scan
- Gestational Age
- Signs of Early Pregnancy Loss
- Ectopic Preg or PUL
- Molar Pregnancy

Criteria for First Trimester Scanning

- Evaluation of the Gestational Sac
  - Presence
  - Location
  - Yolk Sac
  - Size
  - Number
  - Embryo/Fetus
- Gestational Age – CRL
- Double Decidual Sac Sign
- Fetal Cardiac Motion with M-mode
- Uterus, Cervix, Adnexa, Cul-de-sac

Ref: AIUM Practice Parameters, 2018

First Trimester Scanning Technique

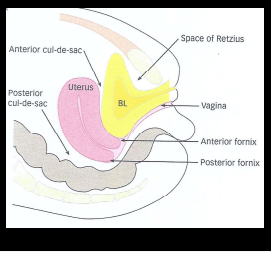
Transabdominal scan (TA)

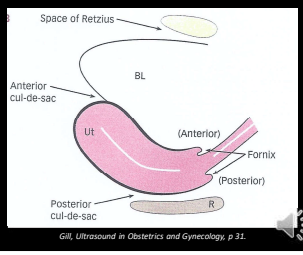
- Most 1st Trimester Pregnancies
- FULL Maternal Bladder
- Appropriate For Many Normal Pregnancies After 7 Weeks Gestation

First Trimester Scanning Technique

- **Transvaginal scan (TV)**
  - Info not obtained w TA
  - Early gest age (<7 wks)
  - Maternal body habitus
  - Abnormal scan
  - Bladder empty

Effect of Bladder Fullness





Gill, Ultrasound in Obstetrics and Gynecology, p 31.

Confirm IUP

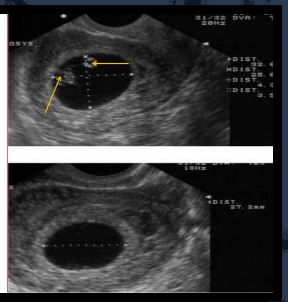
- Gestational Sac (GS) seen as early as 4 ½ - 5 wks menstrual age
- Identify gestational sac and endocervix in the SAME view
- Yolk sac: usually visible when GS size is 8 to 20 mm, 5.5 wks gest
- Embryo: seen by TV at GA 5 ½ to 6 wks; TA at 6-8 wks
- Visualize thick myometrium around gestational sac, usually ≥ 5 mm thick
- Identify the double decidual sac sign

Gestational Age First Seen

Structure	TV
Gest Sac	4.5 – 5
Yolk Sac	5.5
Embryo	5.5 – 6
FHM	6.0
Amnion	7.0

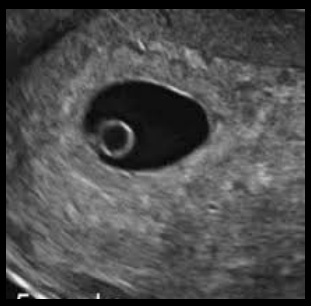
4.5 wk Gestational sac TV

Early Gestational Sac Mean Sac Diameter = 6w3d



Normal Yolk Sac

- Perfectly Round
- Size 5-10 Wks:
  - ≥2 mm to ≤7 mm
- Anechoic



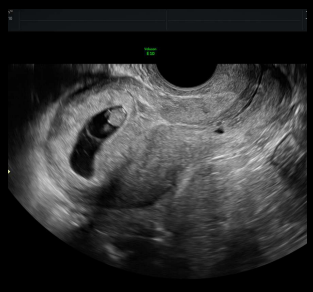
Normal 5 week gestational sac anatomy

Obimages.net/wp-content/uploads/2014/07/9.fw_.ys_.png

Early Gestational Sac w/ Yolk Sac 5.5 weeks

7.0 week TV IUP

- Cervix and gestational sac in same view
- Double decidual sac sign
- Amnion present



Embryonic/Fetal Pole

- CRL used to determine gestational age until large enough for biparietal diameter
- CRL ± 3 - 5 days dating

Crown rump length

7w1d

Measure Crown Rump Length

- Measure top of head to caudal /rump end
- Do not include the yolk sac or fetal extremities
- Take several measurements to assure full length of fetus

Crown Rump Length at 10 Wks

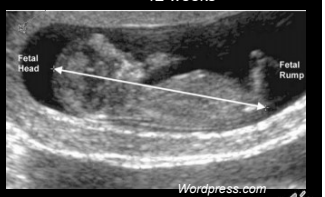
Note Amnion

Norton, p. 93.

Crown Rump Length

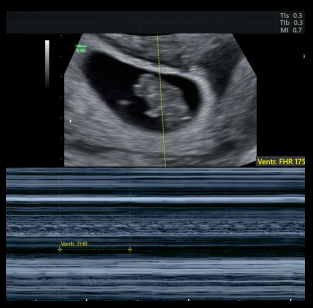
11 weeks

12 weeks



Verification Of Fetal Cardiac Activity

- Identify fetal pole
- With M-Mode pass cursor over fetal pole to demonstrate fhm
- ≤7-8 wks = fhr 90 – 115
- ≥ 9 wks = fhr 140 ± 20



Fetal Heart Motion (FHM)

- FHM should be documented by M-Mode
- FHM usually seen when CRL is ≥ 2 mm
- **Expect** FHM when CRL is ≥ 7 mm
- If no FHM when CRL ≤ 7 mm, follow-up scan in 7-10 days.
- If no FHM when CRL > 7mm = embryonic demise

Identify fetal number

Dating: GA 12-14 weeks

- CRL can be used up to 14 weeks
- Biparietal diameter (BPD), composite gestational age (CGA) are better predictors of GA after 12 weeks
- Follow 2nd trimester guidelines for BPD and CGA

Guidelines for Redating

Gest Age range based on LMP w	Method of Measurement	Discrepancy between US dating and redating that supports redating days
<6 6/7	CRL	>5
< 8 6/7	CRL	>7
9 0/7 – 13 6/7	CRL	>7
14 0/7 – 15 6/7	BD, HC, AC, FL	>7
16 0/7 – 21 6/7	BD, HC, AC, FL	>10
22 0/7 - **27 6/7**	BD, HC, AC, FL	>14
>28 0/7	BD, HC, AC, FL	>21

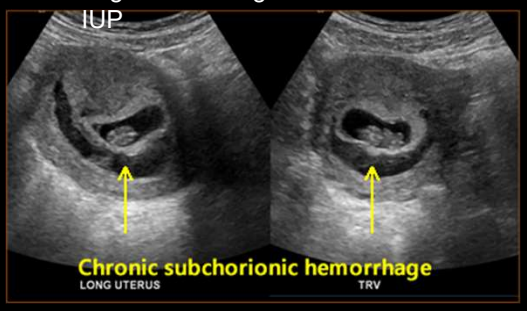
First Trimester Complications

- Embryonic/Fetal Demise
- Vaginal Bleeding
- Ectopic Pregnancy/Pregnancy Of Unknown Location
- Cysts/Masses in First Trimester
- Molar Pregnancy

If abnormal pregnancy is suspected

- Clinical History
- Results of Previous US Exams
- Document Findings of Exam
- Correlate hCG Levels
- Refer

Vaginal Bleeding with a Viable IUP



Obimages.net

Diagnosis of early pregnancy failure:

- Empty Sac when MSD is ≥25 mm
- CRL ≥7 mm w no cardiac activity
- Absence of embryo ≥2 wk after a gestational sac *and NO* yolk Sac
- Absence of embryo with heartbeat ≥11 days after finding a gestational sac *with* a yolk sac

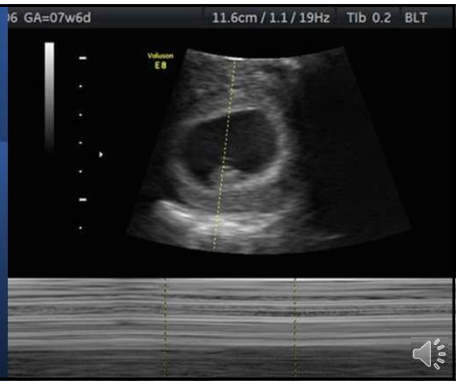
www.obimages.net/wp-content/uploads/2014/07/missedAB.png

Anembryonic Gestation

- Irregular gestational sac
- No yolk sac
- No fetal pole
- No cardiac activity

Confirmation of fetal demise

Absence of fhr on M-Mode



Findings Suspicious for, but Not Diagnostic of Pregnancy Failure

- Crown–rump length of <7 mm and no heartbeat
- Empty amnion (amnion seen adjacent to yolk sac, with no visible embryo)
- Enlarged yolk sac (>7 mm)

Verifying fetal status

- If the crown rump length is less than 7 mm, and there is no heart rate noted,
- Wait and rescan in 7 to 10 days to be certain that this is truly a fetal demise.

- *American Institute of Ultrasound in Medicine, AIUM-ACR-ACOG-SMFM-SRU Practice Parameter for the Performance of Standard Diagnostic Obstet Ultrasound Exams. (2018) J Ultrasound Med 2018; 9999:1-12.*

Using βhCG for Diagnosis

- βhCG levels in viable IUPs, nonviable IUPs, and ectopic pregnancies have considerable overlap. A single βhCG measurement does not distinguish among them. Serial levels are necessary.
- Previously thought that an intrauterine gestational sac was consistently seen on ultrasonography in normal pregnancies whenever the βhCG value was above 2,000 MIU.

Using βhCG for Diagnosis, cont.

- Studies show not as reliable for ruling out a viable pregnancy as originally thought.
- Cases with an embryo with FHM were seen after initial scan showed no gestational sac with an βhCG level above 2000 MIU to 3000 MIU.

Signs of embryonic/fetal demise

Abnormal Yolk Sac
- Misshapen
- Solid or calcified
- Enlarged or too small
- Absent

Signs of embryonic/fetal demise
Yolk sac abnormality

Too Large Yolk Sac

Solid Yolk Sac

Management of First Trimester Embryonic/Fetal Demise

- Correlate history, physical findings, laboratory findings with ultrasound examination.
- Counsel patient regarding results
- Referral as indicated

Ectopic Pregnancy or

Pregnancy of Unknown Location (PUL)

Criteria for Pregnancy of Unknown Location (PUL)

- + Pregnancy test

PLUS

- No intrauterine fluid collection

AND

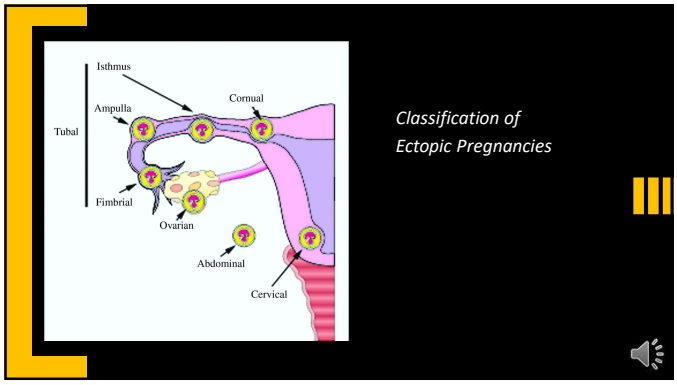
- Normal (or near-normal) adnexa on scan

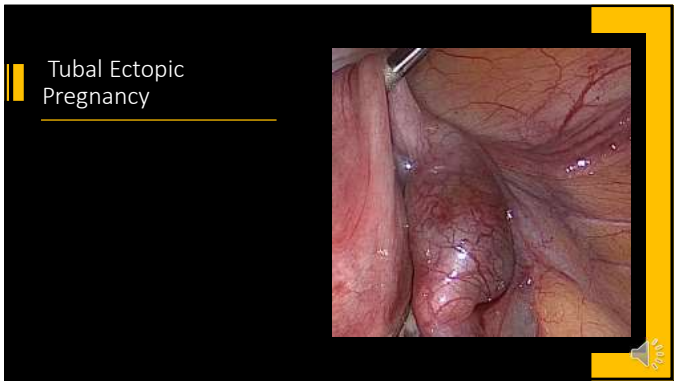
(e.g., Inconsequential adnexal findings include corpus luteum, a small amount of free pelvic fluid, and paratubal cyst)

No intrauterine fluid collection

Pseudogestational Sac

- May be Associated With an Ectopic Pregnancy


Isthmus
Ampulla
Cornual
Tubal
Fimbrial
Ovarian
Abdominal
Cervical
Classification of
Ectopic Pregnancies


Tubal Ectopic
Pregnancy


ECTOPIC PREGNANCY
Adnexal Mass
Non-vialbe fetal pole
Empty Uterus

Ectopic Pregnancy

- *Hill, M.A. (2020, October 22) **Embryology** Ultrasound. Retrieved from https://embryology.med.unsw.edu.au/embryology/index.php/Ultrasound*

ECTOPIC PREGNANCY

- *HTTPS://RADIOPAEDIA.ORG*

Ectopic Pregnancy Symptoms

- 90% lower abdominal pain (1/3 unilateral)
- 50-80% abnormal vaginal bleeding
- 60-70% amenorrhea
- Classic triad (pain, amenorrhea, vb) present in less than 50% of patients

Ectopic/ Pregnancy Unknown Location

- Referral is necessary

Adnexal Masses in Pregnancy

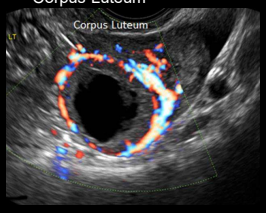
- Common:
  - Corpus Luteum Cyst
    - IUP Normal
    - Associated Extrauterine Cystic Structure
  - Uterine Fibroids
    - IUP Appears Normal
    - Gestational Sac May Be Irregular Due To Fibroid

IUP with Corpus Luteum

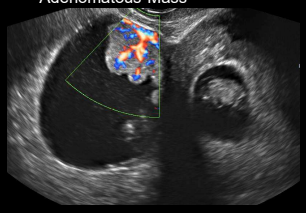
FIGO from glowm.com

Adnexal Masses

Corpus Luteum



Adenomatous Mass



Uterine fibroids

Measure fibroids and note location

Hydatidiform Mole

- History:
  - N&V
  - Rapid Growth Of Uterus Or S>D
  - Vag Bleeding
- Labs:
  - Elevated βhCG
- Scan:
  - Classic "Snowstorm"
    - May be multicystic
    - May have areas of hemorrhage

Molar Pregnancy

Hydatidiform Mole

- Referral is necessary
- Pregnancy must be terminated
- Risk for choriocarcinoma

Summary of First Trimester Scanning

- Point of Care Scope of Practice per AIUM, 2018
- Early First Trimester
- Documentation of Gestational Age, EDD
- Fetal Heart Rate Documentation
- Pregnancy Loss Indicators
- Pregnancy Complications
- Referral indications

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2nd & 3rd Trimester Ultrasound

Carolyn L. Gegor, CNM, MS, FACNM

Indications for Exam & Scope of Practice

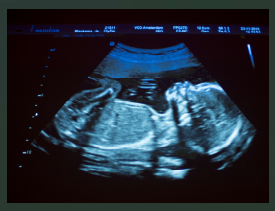
- Gestational Age Assessment
- Confirmation of cardiac activity
- Fetal Lie & Presentation
- Amniotic fluid volume
- Placental location; relationship to cervical os
- Assessment of fetal growth; FGR, Macrosomia
- Assessment of Cervical Length
- 3rd Trimester Assess of Fetal Well-Being
- L&D Triage

"AIUM practice parameter for the performance of limited obstetric ultrasound examinations by advanced clinical providers."

Components of 2nd & 3rd trimester anatomical exams

- Fetal lie and presentation
- Fetal viability
- Placental location
- Identify multiple gestations
- Assess amniotic fluid volumes
- Measurement of the cervical length if indicated
- Fetal anatomical measurements if indicated

Fetal lie and presentation



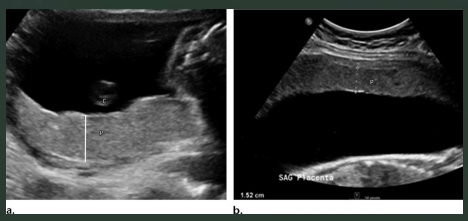
Obimages.net

Fetal Position

Fetal Viability

M-Mode & Pulsed Wave (PW)

Normal Posterior & Anterior Placentas



Fadl S, Moshiri M, Fligner C, et al.

Cord insertion, anterior placenta

Normal Posterior Placenta

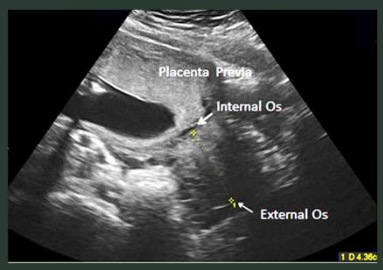
Fadl S, Moshiri M, Fligner C, et al.

Placental location – low in uterus

- Early pregnancy placental location may not correlate with location at delivery
- If not well seen TA, use TV views
- Beyond 16 weeks:
  - If placental edge >2 cms from os = normal
  - If < 2 cms, but not covering os = low lying; repeat at 32 wks
  - If placenta covers os = placenta previa; repeat at 32 wks
- At 32 weeks:
  - If placental edge still < 2cms or covering os, repeat at 36 weeks
  - Earlier f/u if bleeding
  - Include eval for vasa previa. Use TV color flow.

American Institute of Ultrasound in Medicine. AIUM practice parameter for the performance of limited obstetric ultrasound examinations by advanced clinical providers. J Ultrasound Med. 2018;37(7):1587-1596. doi: 10.1002/jum.14677.

Placental previa



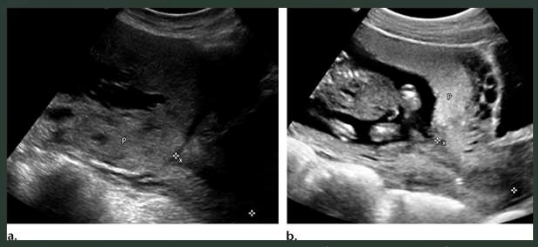
Ultrasoundcare.com.au

Posterior Placenta Previa

Ultrasoundcare.com.au

Posterior Complete Previa @ 28 wks

Low Lying Placenta 16 wks



Fadl S, Moshiri M, Fligner C, et al

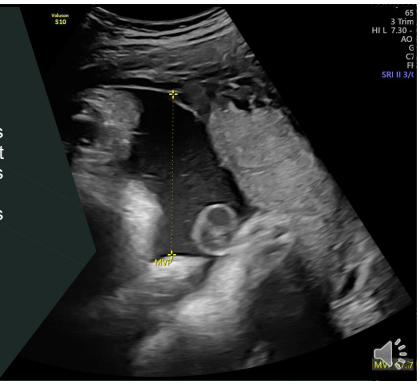
Identify multiple gestations

Amniotic Fluid Volume

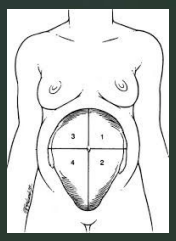
- Deepest Vertical Pocket (DVP)
- Maximal Vertical Pocket (MVP)
  - Measurement at least 1 cm width
  - Normal = 2-8 cms
- Amniotic Fluid Index (AFI)
  - Normal = 5 – 24 cms
- Oligohydramnios, polyhydramnios
- No cord or fetal parts in the fluid pocket

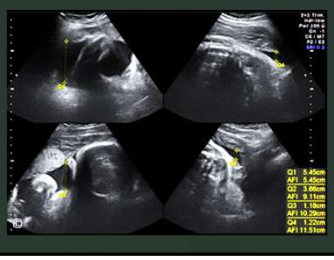
Amniotic fluid volumes
Deepest vertical pocket (DVP/MVP) 2-8 cms

This is 6.7 cms



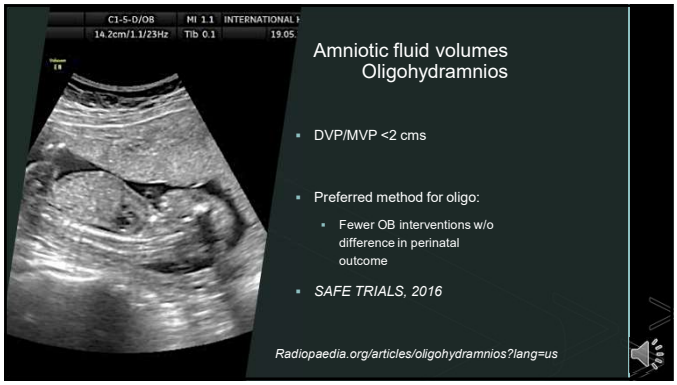
Amniotic Fluid Index (AFI)
<5=oligo; <8 equivocal; >24=poly





Etiologies & Effects of Oligohydramnios

- Early pregnancy
  - Fetal genitourinary anomalies
  - Maternal viral disease
- ≥ 20 weeks
  - Uteroplacental insufficiency
  - Rupture of membranes
  - Major fetal anomalies
    - Hypoplastic lungs
  - Fetal Growth Restriction
  - Preterm birth
- Post term
  - Postmaturity Syndrome
  - ↑ Meconium Stained Fluid
  - ↑ Fetal intolerance of labor



Amniotic fluid volumes
Oligohydramnios

- DVP/MVP <2 cms
- Preferred method for oligo:
  - Fewer OB interventions w/o difference in perinatal outcome
- *SAFE TRIALS, 2016*

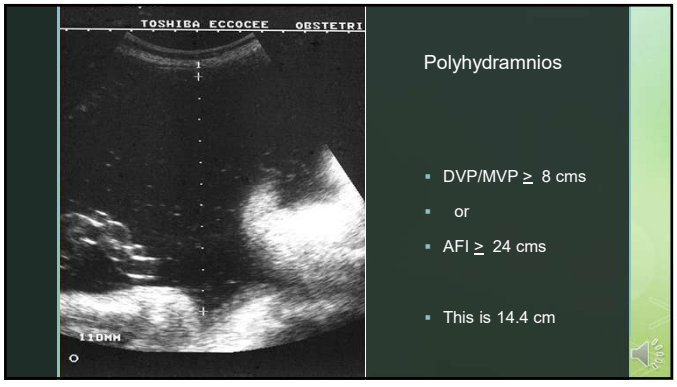
Radiopaedia.org/articles/oligohydramnios?lang=us

Polyhydramnios

Etiologies

- Multiple gestations
- Pregestational Diabetes
- GDM
- Issoimmunization
- Fetal anomalies
  - Tracheoesophageal fistula
  - CNS anomalies eg. anencephaly
- 50-60% is idiopathic

- Complications
  - Maternal dyspnea
  - Preterm Labor
  - PPROM
  - Malpresentation
  - Cord prolapse
  - Abruptio placentae
  - Dysfunctional labor
  - Postpartum Hemorrhage



Polyhydramnios

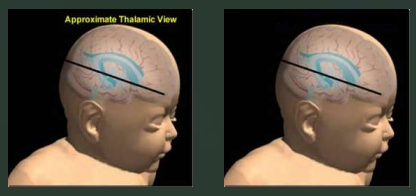
- DVP/MVP ≥ 8 cms
- or
- AFI ≥ 24 cms

- This is 14.4 cm

Fetal anatomical measurements

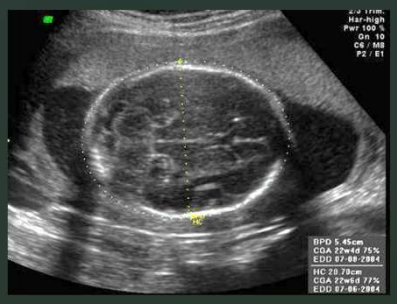
- Fetal biparietal diameter
- Fetal head circumference
- Abdominal circumference
- Fetal femur length
- Estimated fetal weight

Biparietal Diameter View



Obimages.net/wp-content/uploads/2014/08/fnthal.png

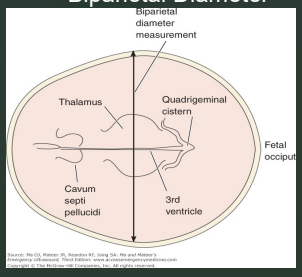
Biparietal Diameter & Head Circumference



- Oval shape with midline structures
  - Thalamus
  - Cavum Septum Pellucidem
  - 3rd ventricle
  - Falx cerebri
  - Choroid Plexus

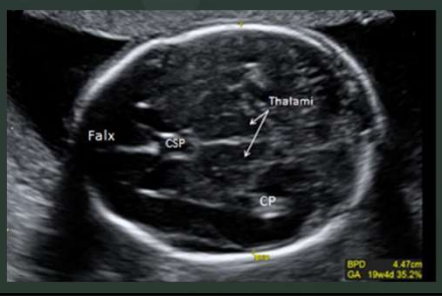
Biparietal Diameter - Anatomy

Biparietal Diameter



Ma OJ, Mateer JR, Reardon RF, Joing SA

Biparietal Diameter

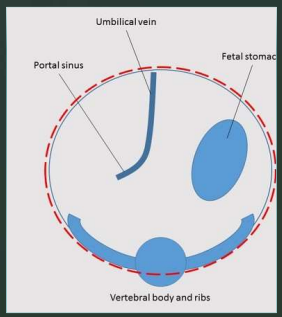


Fetal head circumference

Abdominal Circumference

- Anatomy to identify
  - Round shape
  - Fetal stomach
  - Vertebrae
  - Rib(s)
  - Umbilical vein/portal system

Abdominal Circumference



Radiopaedia.org.fetalabdominalcircumference

Abdominal circumference

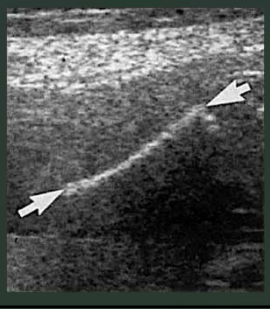
Abdominal Circumference

Jang J, Park Y, Kim B, et al

Femur Length

- Largest & least mobile of long bones, easiest to image
- US beam should be perpendicular to the shaft
- Measured ends should be blunt – measure the diaphysis
- Distal femoral epiphysis should not be measured

- Fetal Femur Length 31w2d



- Fetal femur length 25w2d

- Fetal Femur Length 16w4d

Composite Gestational Age (CGA)

- Consists of biparietal diameter, abdominal circumference and femur length
- Averages the measurements to formulate best gestational age assessment
- Allows for estimated fetal weight (EFW)

Assessment of Fetal Weight

- Requires assessment of multiple biometric measurements
  - Biparietal Diameter (BPD)
  - Head Circumference (HC)
  - Abdominal Circumference (AC)
  - Femur Length (FL)
- EFW is more precise if actual weight is close to the mean weight
- If the actual weight is 2 SD from the mean, the error may exceed 10%

Alterations in fetal growth patterns

- Fetal Growth Restriction (FGR)
- Macrosomia

FGR – Risk Factors - Maternal

- Hypertensive Disorders – Chronic HTN, Gestational HTN, Preeclampsia
- Kidney Disease
- Pregestational Diabetes
- Autoimmune Disorders – SLE, Antiphospholipid syndrome
- Congenital Heart Disease – Cyanotic heart disease, Reduced Cardiac Output
- Previous FGR Infant
- Nutrition, oxygenation & cardiac adaptation to pregnancy are underlying maternal factors.

ACOG Practice Bulletin No. 227: Fetal Growth Restriction. Obstet Gynecol. 2021 Feb;137(2):e16-e28.

FGR – Risk Factors - Fetal

- Multiple Gestation
- Teratogens: antineoplastic, antiepileptic, antithrombotic drugs
- Substance Abuse – Alcohol, Cocaine, Tobacco, Narcotics
- Intrauterine Infections – CMV, Rubella, Syphilis, Varicella
- Genetics – esp. Trisomy 13 & 18
- Placental Abnormalities – abruption, infarction
- Cord Abnormalities

ACOG Practice Bulletin No. 227: Fetal Growth Restriction. Obstet Gynecol. 2021 Feb;137(2):e16-e28.

Fetal Growth Restriction

- EFW or Abd Circ < 10% for gestational age
- Asymmetric – Develops in early 2nd trimester
- Symmetric - Usually begins to develop during late 2nd trimester
- If diagnosed prior to delivery, pregnancy outcomes can be improved
- Lagging fundal height may be first indication

ACOG Practice Bulletin No. 227: Fetal Growth Restriction. Obstet Gynecol. 2021 Feb;137(2):e16-e28

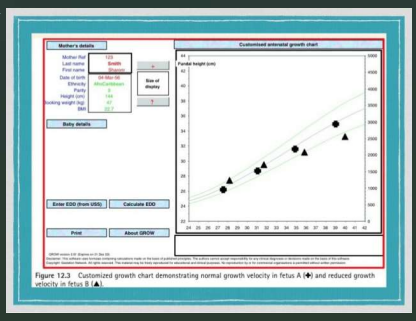


Figure 12.3 Customized growth chart demonstrating normal growth velocity in fetus A (◆) and reduced growth velocity in fetus B (▲).

Fetal Growth Restriction

- When diagnosis is suspected, further studies need to be done
  - Targeted ultrasound exam to R/O anomalies
  - Further evaluation of size of fetal head/ cerebellum measurements
  - Serial ultrasound exams every 3-4 weeks
  - Doppler flow studies
  - Assessment of amniotic fluid volumes
  - Biophysical Profile
- Requires consultation and possible referral

Fetal Macrosomia

- Fetal obesity of 4000 to 4500 grams regardless of gestational age
- Ultrasound is inaccurate in predicting macrosomia, > 13% error over 4500 gms
- With birth weight > 4500 gms, only 50 % weighed within 10% of EFW
- Maternal & Neonatal risk is markedly increased over 4500 gms (ACOG definition)
  - Postpartum hemorrhage
  - Vaginal lacerations
  - Cesarean delivery
  - Shoulder dystocia with risk of brachial plexus injury
  - Stillbirth

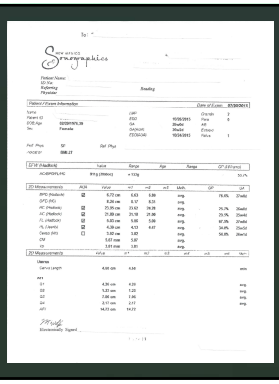
Macrosomia: Predisposing Factors

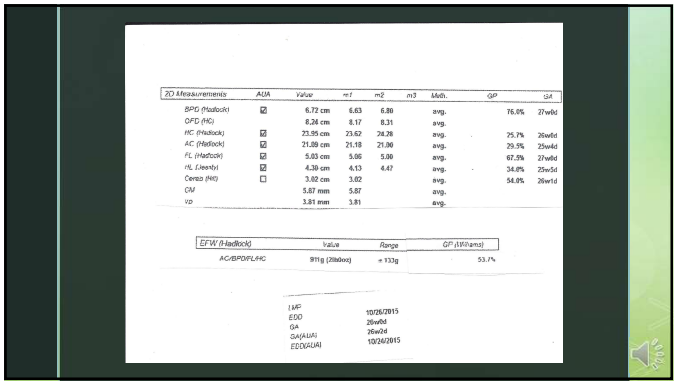
- Pregestational or Gestational Diabetes
- Prior history of macrosomia
- Maternal prepregnancy obesity
- Increased weight gain during pregnancy
- Gestational age > 42 weeks
- Increased maternal birth weight
- Increased maternal height

ACOG Practice Bulletin No. 216: Macrosomia. Obstet Gynecol. 2020 Jan;135(1):e18-e35.

Fetal Growth Patterns: Estimation of Fetal Weight

- BPD & HC are more precise biometric markers of gestational age than AC & FL
- AC is most accurate and sensitive predictor of fetal weight
  - 1st marker of fetal growth abnormalities
- *ACOG Practice Bulletin No. 227: Fetal Growth Restriction. Obstet Gynecol. 2021 Feb;137(2):e16-e28.*





2D Measurements	AUA	Value	m1	m2	m3	Meth.	GP	GA
BPD (Hadlock)	☑	6.72 cm	6.63	6.80		avg.	76.8%	27w6d
OFD (HC)		8.24 cm	8.17	8.31		avg.		
HC (Hadlock)	☑	23.95 cm	23.62	24.28		avg.	25.7%	26w6d
AC (Hadlock)	☑	21.09 cm	21.18	21.00		avg.	29.5%	25w4d
FL (Hadlock)	☑	5.03 cm	5.06	5.00		avg.	67.5%	27w6d
HL (Jeanty)	☑	4.39 cm	4.13	4.47		avg.	34.8%	25w5d
Cerebs (Mit)	☐	3.02 cm	3.02			avg.	54.8%	26w1d
CM		5.87 mm	5.87			avg.		
VD		3.81 mm	3.81			avg.		

EFW (Hadlock)	Value	Range	GP (Williams)
AC/BPD/FL/HC	911g (2lb0oz)	± 133g	53.1%

LMP	10/26/2015
EDD	28w4d
GA	26w2d
DA(AUA)	10/24/2015
EDD(AUA)	

Transvaginal Cervical Length

- Goal: Early identification of risk for Preterm Birth (PTB)
  - PTB is 11.5% of all US births
  - Leading cause of perinatal morbidity & mortality

Indications for Cervical Length

No Hx of PTL:

Screening TV scan at 18 – 22 weeks - Most common time for short cx or funneling to develop in women who deliver preterm.

High Risk of PTL (Hx short CL, PTL, PTB ≤37 wks)

- Screening scan at 14 – 18 wks & 18 – 22 wks

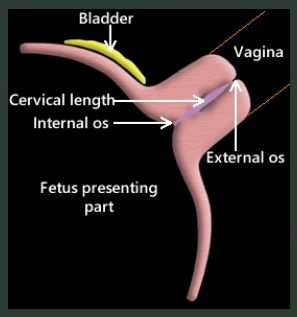
Very High Risk (2nd trimester losses or very early PTB)

- Twice weekly screen 14 – 24 wks
- If CL > 25 mm, then weekly scan

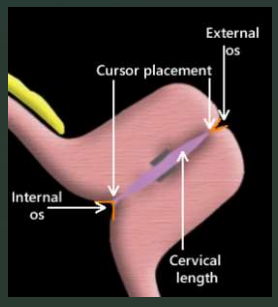
Berghella, 2003
Norton, p. 661

Cervix and changes

- Cervical assessment
- 25 mm or less is a short cervix
  - Transvaginal assessment and measurement of cervical length
  - Recognize cervical funneling
  - Recognize cervical thinning
  - Recognize bulging membranes



Obimages.net/wp-content/uploads/2015/06/7.landmar4..png



Obimages.net/wp-content/uploads/2015/06/12.curson1k.png

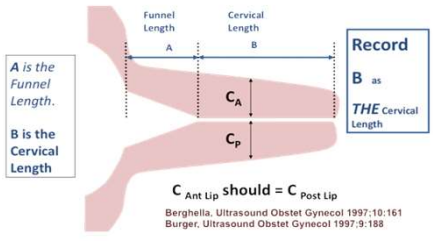
Normal Cervix
TV 24 weeks
mean = 35mm
short = 25mm
w funneling

This is my healthcare.

Normal
Cervix 3rd
Trimester TV

Feltovich H. Vaginal Ultrasound. Obimages.net

Measurement of the Cervix



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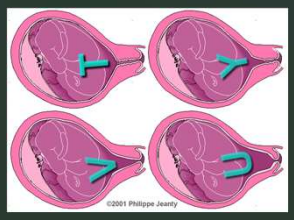
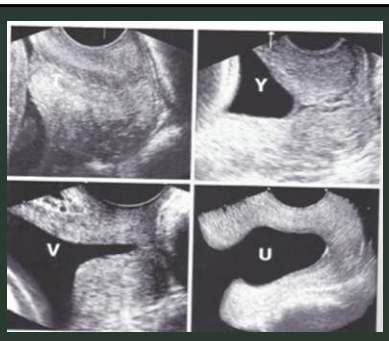
Perinatal Quality Foundation.

Degrees of Cervical Change



Quintero JC, Jeanty P.



Norton, p 662

Scanning experience

- Strong recommendation to take CLEAR course from Perinatal Quality Foundation.
- Need at least 50 supervised scans.

Summary

Scope of Practice 2nd & 3rd Trimester

- Fetal Presentation and Lie
- Placental Location
- Fetal Heart Rate Assessment
- Multiple Gestations
- Amniotic Fluid Volume & Alterations
- Fetal Biometry
- Alterations in fetal growth patterns
- Interpretation of US reports
- Transvaginal Cervical Length

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Obimages.net/wp-content/uploads/2015/06/12.curson1k.png. Cervical diagram focused

Obimages.net/wp-content/uploads/2014/08/fnthal.png Biparietal Diameter View.

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The ultrasound of Life. Head Circumference. Fetal ultrasound.com.

This is my healthcare. Cervical pregnancy scan. Thisismy.co.uk

Ultrasoundcare.com.au. Placenta Previa.

Carolyn L Gegor,
CNM, MS, FACNM

BIOPHYSICAL PROFILE

BIOPHYSICAL PROFILE

- **Used to assess fetal well-being in the 3rd trimester to prevent fetal death**
- Review indications for the BPP
- Learn role of fetal behavior
- Learn the criteria for assessment
- Learn physiology of the BPP
- Learn about management based on the outcome of the BPP
- Learn about the Modified BPP

BIOPHYSICAL PROFILE

MATERNAL INDICATIONS

- Pregestational Diabetes
- Systemic Lupus Erythematosis
- Hypertensive Disorders
- Chronic Renal Disease
- Hyperthyroidism (poorly controlled)
- Hemoglobinopathies
- Cyanotic Heart Disease
- Advanced Maternal Age

ACOG Practice Bulletin #145. Antepartum Fetal Surveillance.

BIOPHYSICAL PROFILE

PREGNANCY-RELATED INDICATIONS

- Gestational Hypertension
- Preeclampsia
- Gestational Diabetes (poorly controlled or medically treated)
- Previous Stillbirth (unexplained)
- Decreased Fetal Motion
- Oligohydramnios
- Fetal Growth Restriction
- Late Term or Postterm Pregnancy

ACOG Practice Bulletin #145. Antepartum Fetal Surveillance.

BIOPHYSICAL PROFILE

Fetal Behavior	Gestational Age
Any Moves	5-6 weeks
General moves	6-7 weeks
Limb moves	10 weeks
Breathing	10-12 weeks
Suck, Swallow	12-14 weeks
Non-Stress Test Reactivity	28 weeks

BIOPHYSICAL PROFILE

Components : (2 points each)

- Fetal tone
- Fetal movements
- Fetal Breathing
- Amniotic Fluid Volume
- Nonstress Test

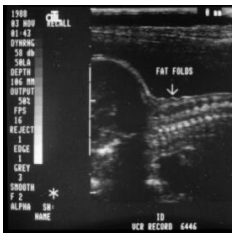
FETAL TONE

1 episode

Flexion/extension extremities/hand

Back of neck

Sucking/swallowing/yawning



FETAL MOVEMENT

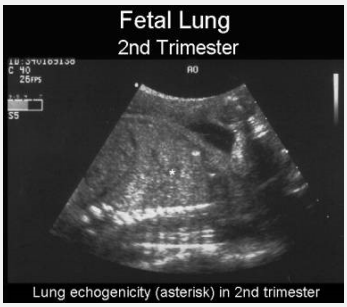
At least 3 episodes

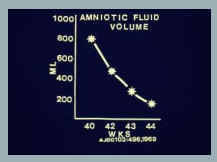
Flexion/extension

General rolling movements

FETAL BREATHING

At least 30 seconds continuous breathing





AMNIOTIC FLUID VOLUME

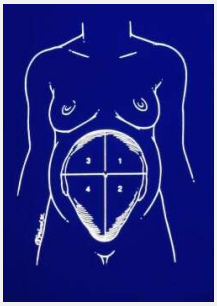
AMNIOTIC FLUID VOLUME

Deepest Vertical Pocket (DVP)
Maximal Vertical Pocket (MVP)

Normal = 2 – 8 cms
At least 1 cm width

AMNIOTIC FLUID INDEX

- Oligohydramnios
  - < 5 cms
- Polyhydramnios
  - > 23 cms

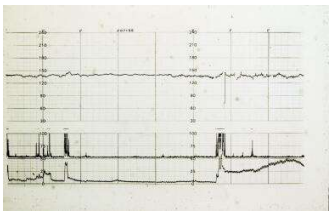


NST
REACTIVE

At Least 2 Accelerations in 20 Minutes

ACOG Practice Bulletin #145. Antepartum Fetal Surveillance.

NST
NONREACTIVE



BIOPHYSICAL PROFILE

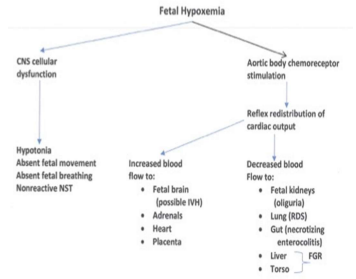
Contributed by Vanessa North, CNM

BIOPHYSICAL PROFILE

Scoring – Possible 2 points each, within 30 minutes

- Fetal tone - 1 episode flexion/extension
- Fetal movements – 3 episodes of movement
- Fetal Breathing – 30 seconds
- Amniotic Fluid Volume
  - DVP >2 cms
  - AFI > 5 cms
- Nonstress Test - Reactive

BIOEFFECTS OF HYPOXIA ON THE FETUS



Adapted from: Druzin, ML, *Antepartum Fetal Assessment*. Boston: Blackwell Scientific. 1992, p. 30.

WHEN TO START WEEKLY TESTING

32 wks
for most indications

Earlier if :
Clinical scenario indicates
Delivery would be considered

ACOG Practice Bulletin #145. Antepartum Fetal Surveillance.

MANAGEMENT OF BIOPHYSICAL RESULTS

BPP Score	Interpretation	Percent Risk of Asphyxia (umbilical venous blood pH 7.25)	Risk of Fetal Death (per 1000/week)	Recommended Management
10/10	Nonasphyxiated	0	0.565	Conservative management
8/10 (normal AFV)	Nonasphyxiated	0	0.565	Conservative management
8/8 (NST not done)	Nonasphyxiated	0	0.565	Conservative management
8/10 (decreased AFV)	Chronic compensated asphyxia	5–10	20–30	If mature (> 37 wks), deliver; serial testing (twice weekly) in the immature fetus
6/10 (normal AFV)	Possible acute asphyxia	0	50	If mature (> 37 wks), deliver; repeat test in 24 hr in immature fetus: If < 6/10, deliver
6/10 (decreased AFV)	Chronic asphyxia w/possible acute asphyxia	>10	>50	Factor in gestational age; If > 32 wks, deliver; If < 32 wks, test daily
4/10 (normal AFV)	Acute asphyxia likely	36	115	Factor in gestational age; If > 32 wks, deliver; If < 32 wks, test daily
4/10 (decreased AFV)	Chronic asphyxia w/ acute asphyxia likely	>36	>115	If > 26 wks, deliver
2/10 (normal AFV)	Acute asphyxia nearly	73	220	If > 26 wks, deliver

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MODIFIED BIOPHYSICAL PROFILE

- NST
- &
- AFI

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DOCUMENTATION & LIABILITY

Ultrasound for Midwives

Carolyn L. Gegor, CNM, MS, FACNM

1

DOCUMENTATION OF THE ULTRASOUND EXAM

- Usually done in separate report format
- May be done as Progress Note in the chart

2

DOCUMENTATION REQUIRED BY THE AIUM FOR REPORT WRITING

2019, AIUM; J ULTRASOUND IN MED 2020, 39:E1-E4

- Patient identification information, e.g., name, age, parity, EDD
- Date of scan
- Location of ultrasound facility and contact information
- Relevant clinical information including indication for the scan
- Specific ultrasound study performed, e.g., 1st trimester dating scan

3

DOCUMENTATION REQUIRED BY THE AIUM FOR REPORT WRITING

- Appropriate anatomic and sonographic terminology should be used;
- Variations from normal must be described
- Limitations of the exam should be noted
- Pertinent biometry should be documented
- Comparison with previous studies should be done if indicated

4

DOCUMENTATION REQUIRED BY THE AIUM FOR REPORT WRITING

- A specific diagnosis or differential diagnoses should be included with recommendations such as follow-up visits.
- The final report should be signed by the interpreting provider.
- Storage of electronic data or printed images should be stored according to institutional and state regulations.
- Reports should be sent to ordering provider within a short period of time. If there are specific concerns, the provider should be notified by phone or in person.

5

LIABILITY IN ULTRASOUND

6

LIABILITY IN ULTRASOUND

- **Inadequate image acquisition**
  - Inadequately trained sonographer
  - Poor quality images insufficient to make the diagnosis
  - Poorly maintained equipment – dated machine, poor image quality

7

LIABILITY IN ULTRASOUND

- **Inadequate or Incomplete studies**
  - Missed diagnosis, e.g. ectopic, pelvic mass, low-lying placenta
  - Must follow guidelines for a full POC study
  - Refer as needed
  - Offer full anatomic scan at the appropriate time – if patient declines, document fully.

8

LIABILITY IN ULTRASOUND

- Errors leading to litigation
  - Perception errors - abnormality is seen in retrospect
    - Ectopic, placenta previa
  - Interpretation errors – neither IUP or ectopic is seen, leading to use of methotrexate assuming a failed pregnancy
    - Should be called a PUL, use f/u βhCG, sono 1 week

9

LIABILITY IN ULTRASOUND

- Failure to suggest the next appropriate procedure
  - Referral or return visit
  - Significant size/date discrepancy
  - Ectopic findings are equivocal
  - Postmenopausal endometrial thickness >4 mm

10

LIABILITY IN ULTRASOUND

- Failure to communicate critical results to the referring provider
  - suspected or known fetal anomalies
  - ectopic pregnancy
  - FGR
  - placenta previa
  - Gyn pelvic mass

11

LIABILITY IN ULTRASOUND

- Failure to perform or order an indicated ultrasound.
- Failure to maintain images and documentation of reports.
- Failure to obtain informed consent, including limitations of the study, esp. POC (does not identify anomalies)
- Failure to provide timely and complete ultrasound findings with referring provider.

12

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13

ULTRASOUND BUSINESS IMPLEMENTATION

Leslie Cornwell, CNM
Midwifery Business Consultation

MBC

Why is this important?

- Save money, time, and resources by planning the implementation process
- Patient safety and improved outcomes of care
- Understanding your professional and regulatory obligations required to add this service
- Closely look at your income and expense ramifications to your practice's current budget
- Look at strengths and weaknesses to adding ultrasound services to your practice

Private Practice Benefits

- Improved quality of care for patients
- Greater access to resources for families
- Additional services offered by APRNs and midwives
- Additional income stream into practice

https://www.nct.org.uk/pregnancy/who-will-care-for-you-during-pregnancy/what-midwife

Adding Ultrasound Services to Private Practice

Learn your professional scope and regulatory positions on ultrasound implementation

Budget analysis to add this additional ancillary service

STAGE ONE

STAGE TWO

Training yourself and staff on ultrasound utilization

Take certification exams

Create clinical policies, competency protocols, and documentation templates

Marketing services to the clients and public

STAGE THREE

STAGE FOUR

Getting ultrasound equipment

Work with billing team to create fee schedule, adding charges to billing system, and claim processing resources

STAGE ONE

Understanding Professional Scope

- Advanced Practice Nurse
  - Family Nurse Practitioner
  - Women's Health Nurse Practitioner
- Certified Nurse Midwife
- Certified Midwife
- Licensed Midwife
- Certified Professional Midwife
- Direct Entry Midwife

https://www.zanzu.nl/en/seeing-midwife-or-gynaecologist-during-pregnancy

STAGE ONE

ACNM Position Statement

- It is within the scope of midwifery practice for midwives to perform ultrasound examinations.
- Performance of ultrasound examinations can be incorporated into midwifery practice by following the Standards for the Practice of Midwifery, which delineates the requirements for expanding midwifery skills beyond those outlined in the ACNM's Core Competencies for Basic Midwifery Education.
- Midwives who wish to incorporate ultrasound examinations into their scope of clinical practice should have appropriate education and training, acquire the necessary skills, and demonstrate the specific competencies to master the studies they perform.
- Education and training for ultrasound can be incorporated into certified nurse midwife/certified midwife (CNM/CM) education programs as an added skill beyond those required in the Core Competencies, or the necessary education for performance of ultrasound can be obtained on a continuing education basis following a structured curriculum.
- Midwives who perform ultrasound examinations following appropriate education and training should be eligible for reimbursement for these services.
- State regulations and licensing related to midwifery scope of practice should provide for CNMs/CMs to perform ultrasound, interpret and implement management commensurate with their education and training.

STAGE ONE

Understanding State Regulations

- ALWAYS refer to your state affiliates for updates on scope of practice in your local area
- Many states mention in midwives scope of practice to interpret ultrasound results
- Most states don't specifically address ultrasound utilization by midwives
- Especially for CPMs, DEMs, LMs, couldn't find any state that gave any position statement on scope of practice (none also found with NARM)
- Some health insurance companies will reimburse for procedure performance by APRNs and midwives
  - Talk with your local insurance companies about their specific policies around reimbursement for ultrasound billing

STAGE ONE

Regulatory Boards for Ultrasound Use

- ARDMS (American Registry for Diagnostic Medical Sonography)
- AIUM (American Institute of Ultrasound in Medicine)
- American Congress of Obstetricians and Gynecologists (ACOG)
- ACNM (American College of Nurse Midwives)
- Association of Women's Health, Obstetric, and Neonatal Nursing (AWHONN)
- Midwifery and Nursing State Boards

STAGE ONE

Budgeting for Implementation

- Income possibilities
  - Improved care and "one stop shop" for clients
  - Ultrasound average reimbursement
- Expense Challenges
  - Training staff
  - Continued education
  - Quality Assurance and competency checklists
  - Purchasing equipment
  - Maintaining equipment

STAGE TWO

Training Staff

- As a new hire, document competencies and certifications
- Sign up staff for courses and exams still needing ultrasound training
- Schedule ultrasound training with another experienced APRN or midwife
- Document all orientation experience gained
- Any updates with guidelines, research, or clinical indications communicated to staff
- Peer reviewed case studies at staff meetings
- Yearly competency evaluation

https://en.wikipedia.org/wiki/Midwife

STAGE TWO

Certification Process

book designed for preparation of the ARDMS exam

- In order to earn the Midwife Sonography Certificate, you must apply, and meet the eligibility requirements and then complete both parts of the examination process:
  - **Part One:** Midwife Sonography Computer-based Examination
  - **Part Two:** Practical Examination (You may begin acquiring this practical experience before passing the Computer-based examination. This experience can be completed up to 2 years before passing the Computer-based examination and/or up to 2 years after passing the Computer-based examination. Documentation of the cases must be received in the office within 2 years after passing the Computer-based examination.)

https://pegasuslectures.com/midwifesonography.php

STAGE THREE

Creating Policies

- New hire training
- Yearly competency review
- Scope of practice
- Clinical indications
- Cleaning and maintaining equipment
- Collaboration
- Transfer of care
- Documentation Expectations
- Billing Protocols

STAGE THREE

Competency Protocols

- Observed ability to identify anatomical parts of the abdomen, pelvis, and fetus
- Observed ability to identify fetus' position, heart rate, and major anomalies
- Observed ability to identify placenta location, uterus, ovaries, and cervix
- Observed ability to measure AFI
- Observed ability to perform BPP
- Observed ability to date pregnancy from measuring fetus
- Observed ability to measure cervical length

https://www.euro.who.int/en/health-topics/Health-systems/nursing-and-midwifery/personal-stories/eva-tegnander-educating-midwives-on-ultrasound-technology-for-more-than-30-years

STAGE THREE

Documentation

- Accurate and complete documentation and communication by all members of the diagnostic ultrasound health care team are essential for high-quality patient care
- Ultrasound examinations should be recorded in a manner that will allow subsequent review for adequacy for diagnostic purposes
  - Patient's name and other identifying information
  - Facility's identifying information
  - Date and time of the ultrasound examination
  - Output display standard (thermal index and mechanical index)
  - Label of the anatomic location and laterality, when appropriate
  - Image orientation when appropriate
- Final report should include but is not limited to the following demographic components
  - Patient's name and other identifying information
  - Name of the ordering provider
  - Location of the ultrasound facility and contact information
  - Relevant clinical information, including the indication for the examination and/or current version of the appropriate International Classification of Diseases code
  - Date and time of the ultrasound examination
  - Specific ultrasound examination performed

STAGE THREE

Marketing

- Networking with local practices (other midwives not offering this service)
- Flyers
- Brochures
- Social Media
- Email Campaigns
- Boutique Services
  - Gender Reveal
  - 3D/4D Pictures
- Staff Education

STAGE FOUR

Purchasing vs Renting Equipment

- Cost analysis
  - What type of ultrasounds are you going to perform?
  - Are you just at the office or doing home visits?
  - What is the purpose of adding ultrasound services to your practice?
  - How often will machine be utilized?
- Decide if you want new vs used
- Review products available
- Talk with other midwives already using ultrasound machines
- Talk with local reps in ultrasound machine businesses
  - See if financing options available with company
  - See rental versus purchase price comparison

https://www.philips.com.vn/healthcare/sites/lumify/news/articles/poc-ultrasound-in-rural-africa

STAGE FOUR

Billing Implementation

- Determine overhead costs for equipment, upkeep, and training staff
- Add to fee schedule billable charges
- Add charges into billing systems
- Negotiating with insurance companies
- Training billing staff

Importance of Planning Business Implementation

- Save money, time, and resources by planning the implementation process
- Patient safety and improved outcomes of care
- Understanding your professional and regulatory obligations required to add this service
- Closely look at your income and expense ramifications to your practice's current budget
- Look at strengths and weaknesses to adding ultrasound services to your practice

BILLING MATERNITY ULTRASOUND EXAMS

Stacy Carruth, CPM
Midwives Advantage

Objectives

- Be able to understand basics of billing and coding for ultrasound services
- Be able to process insurance claims for ultrasound procedures within scope of midwifery
- Be able to list the medically indicated reasons for ultrasound services and insurance reimbursement
- Be able to advocate for insurance reimbursement for midwives

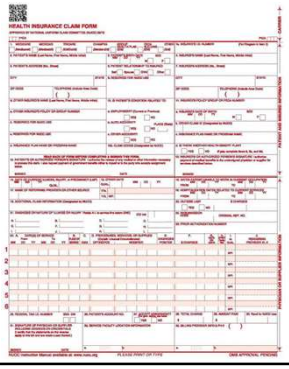
Basic Billing Essentials

- Many patients are covered under multiple policies
  - Patients can be on their parent's insurance until age 26 and could also have their own policy through their employment or a spouse
  - After determining the number of policies a patient has, the next step is to determine which order to bill
  - ***Always bill the primary insurance first even if maternity is excluded in that plan***
- Spell the patient's name exactly as it appears on the insurance card (even if the name is incorrect!)
  - If a married patient is on her parent's insurance, her name with the insurance is probably her pre-marriage name.
  - Verify patient's date of birth and address
- Ask patient to contact insurance and complete a COB (coordination of benefits) document
  - Failure to file current COB with insurance is a common reason for the denial of claims

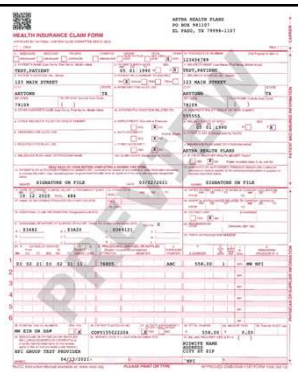
Basic Billing Essentials

- Things required on all insurance billable charges
  - Patient's Name
  - Date of Birth
  - Pertinent Demographics
  - Date of Service
  - Services Rendered (CPT codes)
  - Applicable Diagnosis Codes (ICD 10 codes)
  - Location of Services Rendered
  - Rendering Provider's Information (name, NPI #, address)
  - Supporting Documentation

HCFA -1500 (Professional Claim Form)



Sample Completed Claim Form



Levels of Ultrasound Examinations

- Hand-carried ultrasound systems are reported using the same ultrasound codes that are submitted for studies performed with cart-based ultrasound systems so long as the usual requirements are met
- All ultrasound examinations must meet
  - Requirements of medical necessity as set forth by the payers
  - Requirements of completeness for the code that is chosen
  - Documented in the patient's record, regardless of the type of ultrasound equipment that is used

Levels of Ultrasound Examinations

- **Standard obstetric ultrasound examination**
  - Evaluation of fetal presentation and number
  - Amniotic fluid volume
  - Cardiac activity
  - Placental position
  - Fetal biometry
  - Fetal number and anatomic survey
  - Maternal cervix and adnexa should be examined as clinically appropriate
- **Limited obstetric ultrasound examination**
  - Performed when a specific question requires investigation
  - May also be performed in any trimester to evaluate
    - Interval growth
    - Estimate amniotic fluid volume
    - Evaluate the cervix
    - Assess embryonic or fetal activity
- **Specialized obstetric ultrasound examination**
  - Also referred to as a "detailed" examination (76811)
  - Performed when there is an increased risk of an anomaly based on the history, laboratory abnormalities, or the results of other exams

Place of Service

Office is the most used POS code for ultrasound even if preformed in the patient's home

Homes can qualify as an office if the health professional routinely provides examinations in that location on an ambulatory basis

11	Office	Location where the health professional routinely provides health examinations, diagnosis, and treatment of illness or injury on an ambulatory basis.
12	Home	Location, other than a hospital or other facility, where the patient receives care in a private residence.
15	Mobile Unit	A facility/unit that moves from place-to-place equipped to provide preventive, screening, diagnostic, and/or treatment services.
25	Birthing Center	A facility, other than a hospital's maternity facilities or a physician's office, which provides a setting for labor, delivery, and immediate post-partum care as well as immediate care of newborn infants.

CPT Codes

CPT Coding:

CPT	DESCRIPTION	POSSIBLE FEE RANGE
76801	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, first trimester (less than 14 weeks 0 days), transabdominal approach; single or first gestation	$409-$516
76802	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, first trimester (less than 14 weeks 0 days), transabdominal approach; each additional gestation (List separately in addition to code for primary procedure performed)	$235-$295
76805	Ultrasound, pregnant uterus, real time with image documentation; (fetal and maternal evaluation), after first trimester (greater than or equal to 14 weeks 0 days), transabdominal approach; single or first gestation	$458-$575
76810	Ultrasound, pregnant uterus, real time with image documentation; (fetal and maternal evaluation), after first trimester (greater than or equal to 14 weeks 0 days), transabdominal approach; each additional gestation (List separately in addition to code for primary procedure)	$320-$398
76811	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation plus detailed fetal anatomic examination, transabdominal approach; single or first gestation	$680-$845
76812	Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation plus detailed fetal anatomic examination, transabdominal approach; each additional gestation (List separately in addition to code for primary procedure)	$622-$780
76815	Ultrasound, pregnant uterus, real time with image documentation, limited (e.g., fetal heartbeat, placental location, fetal position and/or qualitative amniotic fluid volume), one or more fetuses	$295-$370
76816	Ultrasound, pregnant uterus, real time with image documentation, follow-up (e.g., re- evaluation of fetal size by measuring standard growth parameters and amniotic fluid volume, re-evaluation of organ system(s) suspected or confirmed to be abnormal on a previous scan), transabdominal approach, per fetus	$291-$364
76817	Ultrasound, pregnant uterus, real time with image documentation, transvaginal	$346-$435

CPT Codes

- 76801 & 76802: determination of the number of gestational sacs and fetuses, gestational sac/fetal measurements appropriate for gestation
- 76805 & 76810: determination of number of fetuses and amniotic/chorionic sacs, measurements appropriate for gestational age (> or =14 weeks 0 days), survey of intracranial/spinal/abdominal anatomy, 4 chambered heart, umbilical cord insertion site, placenta location and amniotic fluid assessment and, when visible, examination of maternal adnexa
- 76811 & 76812: include all elements of 76805 & 76810 plus detailed anatomic evaluation of the fetal brain/ventricles, face, heart/outflow tracts and chest anatomy, abdominal organ specific anatomy, number/length/architecture of limbs and detailed evaluation of the umbilical cord and placenta and other fetal anatomy as clinically indicated
  - Patient record should document the results of the evaluation of each element described above or the reason for non-visualization

CPT Codes

- 76815: focused “quick look” exam limited to the assessment of one or more of the elements listed in 76815
- 76816: exam designed to reassess fetal size and interval growth or reevaluate one or more anatomic abnormalities of a fetus previously demonstrated on ultrasound and should be coded once regardless of the number of fetus
  - Bill on one line indicating the number of fetus in the unit's field
- 76817: describes a transvaginal obstetric ultrasound performed separately or in addition to one of the transabdominal examinations described above
  - For transvaginal examinations performed for non-obstetrical purposes, use 76830

CPT Codes

- 76801: ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, first trimester
- 76802: each additional gestation (list separately in addition to primary procedure)
  - Use 76802 in conjunction with 76801
- 76805: Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation, after first trimester (> or = 14 weeks 0 days), transabdominal approach (complete fetal and maternal evaluation); single or first gestation

CPT Codes

- 76810: each additional gestation (list separately in addition to primary procedure)
  - Use 76810 in conjunction with 76805
- 76811: Ultrasound, pregnant uterus, real time with image documentation, fetal and maternal evaluation plus detailed fetal anatomic examination, transabdominal approach (complete fetal and maternal evaluation); single or first gestation
- 76812: each additional gestation (list separately in addition to primary procedure)
  - Use 76812 in conjunction with 76811
- 76813: Ultrasound, pregnant uterus, real time with image documentation, first trimester fetal nuchal translucency measurement, transabdominal or transvaginal approach; single or first gestation

CPT Codes

- 76814: each additional gestation (list separately in addition to primary procedure)
- 76815: ultrasound, pregnant uterus, real time with image documentation, limited (fetal heartbeat, placental location, fetal position and/or qualitative amniotic fluid volume), one or more fetuses
  - Use 76815 only once per exam and not per element
  - Use ONLY code 76815 to report ultrasound services provided in conjunction with procedure codes 59812-59857
  - Procedure code 76815 should be billed regardless of the approach used to perform the ultrasound procedure (transvaginal)
- 76816: ultrasound, pregnant uterus, real time with image documentation, follow-up (eg, re-evaluation of fetal size by measuring standard growth parameters and amniotic fluid volume, re-evaluation of organ system(s) suspected or confirmed to be abnormal on a previous scan), transabdominal approach, per fetus

CPT Codes

- 76817: ultrasound, pregnant uterus, real time with image documentation, transvaginal
  - If transvaginal examination is done in addition to transabdominal obstetrical ultrasound exam, use 76817 in addition to appropriate transabdominal exam code
- 76818: fetal biophysical profile; with non-stress testing
- 76819: without non-stress testing
- 76820: Doppler velocimetry, fetal; umbilical artery
  - Billable with a diagnosis of polyhydramnios, oligohydramnios, placental transfusion syndromes or poor fetal growth

CPT Codes

- 76821: middle cerebral artery
  - Billable with a diagnosis of rhesus isoimmunization, placental transfusion syndromes or viral diseases complicating pregnancy (parvovirus B-19 infection)
- 76825: echocardiography, fetal, cardiovascular system, real time with image documentation (2D), with or without M mode recording;
- 76826: follow-up or repeat study
- 76827: doppler echocardiography, fetal, pulsed wave and/or continuous wave with spectral display; complete
- 76828: follow-up or repeat study

Modifiers

- CPT Modifier is a two-position alpha and alpha-numeric code used to identify certain situations that require the basic value of a procedure to be either enhanced or diminished
- Modifiers provide the means by which a service or procedure that has been performed can be altered without changing the procedures code
- If a provider performs both the technical component and the professional component, no modifier is added to the CPT code

Modifiers

- If the provider did not perform both, appropriate modifier is listed in column D on the 1500 claim form
  - Modifier 26 is defined as "Professional Component" and should be appended to a procedure code when the provider rendered only the professional component of the service
  - Modifier TC is defined as "Technical Component" and should be appended to a procedure code when the provider rendered only the technical component of the service

ICD-10 Diagnosis Codes Antenatal

Z36.0 Encounter for antenatal screening for chromosomal anomalies
Z36.1 Encounter for antenatal screening for raised alpha-fetoprotein level
Z36.2 Encounter for other antenatal screening follow-up
Z36.3 Encounter for antenatal screening for malformation
Z36.4 Encounter for antenatal screening for fetal growth retardation
Z36.5 Encounter for antenatal screening for isoimmunization
Z36.8 Encounter for other antenatal screening
Z36.81 Encounter for antenatal screening for hydrops fetalis
Z36.82 Encounter for antenatal screening for nuchal translucency
Z36.83 Encounter for fetal screening for congenital cardiac abnormalities
Z36.86 Encounter for antenatal screening for cervical length
Z36.87 Encounter for antenatal screening for uncertain dates

Z36.88 Encounter for antenatal screening for fetal macrosomia
Z36.89 Encounter for other specified antenatal screening
Z36.8A Encounter for antenatal screening for other genetic defects
Z36.9 Encounter for antenatal screening, unspecified

Z3A.20 20 weeks gestation of pregnancy

Link to Anthem Dx Codes for US

Documentation Essentials

- All diagnostic ultrasound examinations, including those when ultrasound is used to guide a procedure, require that permanently recorded images be maintained in the patient record
  - Images can be kept in the patient record or some other archive – they do not need to be submitted with the claim
  - Images can be stored as printed images, on a tape or electronic medium
  - Documentation of the study must be available to the insurer upon request
- Written report of all ultrasound studies should be maintained in the patient's record
  - In the case of ultrasound guidance, the written report may be filed as a separate item in the patient's record, or it may be included within the report of the procedure for which the guidance is utilized

Documentation Essentials

- Third Party Insurance Payment Policies Private insurance payment rules vary by payer and plan with respect to which specialties may receive reimbursement for ultrasound services
  - Some payers will reimburse providers of any specialty for ultrasound services while others may restrict imaging procedures to specific specialties or providers only
  - Some insurers require physicians to submit applications requesting that ultrasound be added to their list of services performed in their practice
- Ultrasound examinations should be recorded in a manner that will allow subsequent review for adequacy for diagnostic purposes
- Although for some applications still-frame images may suffice, archiving of video imaging may be required or preferred for some types of examinations

Documentation Essentials

- Archived images should contain the following:
  - Patient's name and other identifying information
  - Facility's identifying information
  - Date and time of the ultrasound examination
  - Label of the anatomic location and laterality, when appropriate
  - Image orientation when appropriate
- If a worksheet is used and retained, documentation on the worksheet should contain, at a minimum, the patient's name and other identifying information, date and time of the ultrasound examination, and name of the person(s) who performed the examination and completed the worksheet

Documentation Essentials: Final Report Provided

- Signed final report of the ultrasound findings and impression should be included in the patient's medical record and is the definitive documentation of the study
- Final report should include but is not limited to the following demographic components:
  - Patient's name and date of birth
  - Name, address and phone number of the provider
  - Diagnosis (ICD-10 code) for the examination
  - Date and time of the examination
  - Exam performed
- Report should include a description of the examination, including comments on the components of the examination as outlined in the relevant practice parameters

Documentation Essentials

- Any significant patient reaction or complication should be documented
- Anatomic measurements (ex, fetal biometry), as appropriate, and measurement of abnormal structures or organs, if taken
- Description of examination findings, using appropriate anatomic and ultrasound terminology

Documentation Essentials

- Concluding statements or summary of the report should include these components:
  - An impression, conclusion, or summary statement
  - A specific diagnosis or differential diagnosis
  - A recommendation, if applicable, for follow-up studies
  - An accounting of any failure to include standard views or other necessary components (as listed in the appropriate practice parameter)
  - If prior relevant imaging studies were reviewed, a statement of comparison should be included
  - Details concerning any provider-to-provider communication in cases in which a delay in communication may have an adverse effect on the patient's outcome
  - The interpreting provider has the responsibility to make the report available to the ordering provider, and the ordering provider has a responsibility to review the final report. The imaging facility should archive a retrievable copy of the final report as part of the patient's medical record and ensure that the requesting provider has access to the final report or a copy of the report

Medical Necessity

- Obstetrical ultrasound examination in the first trimester of pregnancy **meets the definition of medical necessity**, for a medical reason including, but is not limited to the following:
  - Evaluation of suspected ectopic pregnancy
  - Evaluation of vaginal bleeding
  - Evaluation of pelvic pain
  - Estimation of gestational age
  - Diagnosis or evaluation of multiple gestations
  - To confirm cardiac activity
  - As an adjunct to chorionic villus sampling, embryo transfer, or localization and removal of intrauterine device
  - Assessment of fetal anomalies (ex: anencephaly) in members at high-risk
  - Evaluation of maternal pelvic masses and/or uterine abnormalities
  - Screening for fetal aneuploidy
  - Evaluation of suspected hydatidiform mole

First Trimester
(less than 14 weeks, 0 days)

- First-trimester obstetric ultrasound examination is an ultrasound examination performed before 14 0/7 weeks of gestation
- Indications for performing first-trimester obstetric ultrasound examinations include, but are not limited to the following indications:
  - To confirm the presence of an intrauterine pregnancy, determine number of fetuses and determine gestational age
  - To evaluate a suspected ectopic pregnancy or hydatidiform mole
  - To evaluate pelvic pain and/or define the cause of vaginal bleeding
  - To confirm cardiac activity
  - To assess fetal anomalies (e.g., anencephaly) in patients at high-risk
  - To screen for fetal aneuploidy

Second Trimester
(14 weeks, 0 days through 27 weeks and 6 days)

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Third Trimester
(28 weeks through delivery)

- According to ACOG, the optimal time for a single ultrasound examination is at 18-20 weeks of gestation
  - Allows visualization of fetal anatomy and an estimation of gestational age
  - Allows organs like the fetal heart and brain to be imaged with sufficient clarity to allow detection of many major malformations.

Second Trimester
(14 weeks, 0 days through 27 weeks and 6 days)

&

Third Trimester
(28 weeks through delivery)

- Medical indications for performing second and third-trimester obstetric ultrasound examinations include, but are not limited to the following indications:
  - Estimation of gestational age and evaluation of fetal growth
  - Evaluation of vaginal bleeding
  - Evaluation of abdominal and pelvic pain
  - Rule out or confirm sufficiency of cervix
  - Determine presentation
  - Evaluation of suspected multiple gestation
  - Significant discrepancy between clinical dates and uterine size
  - Rule out or confirm hydatidiform mole
  - Suspected ectopic pregnancy or uterine/amniotic fluid abnormality
  - Suspected fetal death
  - Evaluation of fetal well-being
  - Addition to external cephalic version
  - Evaluation premature labor or pre-labor rupture of membranes
  - Evaluation of placental location for suspected placental previa/abruption
  - Screening for fetal anomalies

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