ARDMS
An Inteleos Community

Obstetrics and Gynecology

Practice Analysis Detailed Report

ARDMS approved March 2021.

Contents

Revision Hisotry:

2021-03-17	Added ARDMS Council Approval

ACKNOWLEDGEMENTS

Thank you to the subject matter expert volunteers who spent many hours developing the task inventory, evaluating the survey and responses, and reviewing the final content outline. Also, thank you to the 400 Registered Diagnostic Medical Sonographers (RDMSs) certified in Obstetrics and Gynecology (OB/GYN) around the world who took the time to participate in the practice analysis survey. This study was completed through the efforts of many individuals at Inteleos who worked together to construct the survey, administer the survey, and analyze the data.

EXECUTIVE SUMMARY

The American Registry for Diagnostic Medical Sonography (ARDMS), part of the Inteleos family of certifications, is the globally recognized standard of excellence in sonography. The ARDMS is responsible for the preparation of valid and reliable certification examinations in the field of sonography. Conducting practice analyses at the national and international levels allows the ARDMS to evaluate the current practice expectations and performance requirements within the field. The OB/GYN practice analysis collected information on the requisite OB/GYN knowledge, skills, and abilities essential to sonography professionals. The practice analysis kicked-off with a workshop held in May of 2019. A pilot survey of the task inventory developed by the workshop panel was sent to a second panel of SMEs. The practice analysis survey was administered in January 2021. The analysis and discussion of results by the OB/GYN Assessment Committee led to the recommended content outline found in Appendix F. This report details the methodology, data collection, analysis, and the recommended updated test content outline for the OB/GYN examination based on the results of the practice analysis.

BACKGROUND OF STUDY

The ARDMS recognizes that diagnostic medical sonography is a valuable tool in the healthcare industry. There are several healthcare professions that utilize sonography in practice to increase the efficacy of their patient care. Successful mastery and demonstration of the knowledge and skills required to hold ARDMS sonographer credentials will provide sonographers with an additional source of validation. This will support the veracity of the diagnostic medical sonography exams that these practitioners perform. The OB/GYN examination assesses the knowledge, skills, and abilities in the areas of the female reproductive system as well as the fetus in the first, second, and third trimesters of pregnancy as related to diagnostic ultrasound.

METHODOLOGY

Selection and Profile of Subject Matter Experts

Workshop Panel

A panel of 12 subject matter experts (SMEs) attended an in-person workshop. The panel members were volunteers, and some were members of the OB/GYN Assessment Committee (see Appendix A). The panel was chosen to be representative of the practice to the extent possible (demographic information can be found in Appendix A). 11 panelists held the RDMS certification in OB/GYN and one panelist was a practicing OB/GYN physician. A description of the workshop is below.

Remote Panel

A second panel comprised of three subject matter experts who hold the RDMS OB/GYN certification reviewed the drafted task inventory from the workshop and were given an opportunity to provide clarification and feedback on the tasks via an online survey. Appendix A contains information regarding this panel. More details regarding the work of the remote panel are given below.

Panelist Interviews and Workshop

Structured interviews were scheduled with panel members as schedules allowed to provide the facilitator background information about the practice. Workshop panel members attended the in-person workshop May 30-31, 2019. See Appendix B for the workshop agenda. The facilitator briefed the panel on the purpose and methods of practice analyses. Panel members were led through activities to determine broad categories of work and tasks that comprise the practice of an OB/GYN Sonographer. Using the results of these activities and discussions, the panel then developed a preliminary task inventory.

Confirmation of Task Inventory

A remote panel was assembled to review the task inventory that was developed as part of the workshop. The remote panel was instructed to review all the tasks on the task inventory and provide feedback to improve clarity and clinical accuracy. The remote panel was also given an opportunity to add additional tasks to the task inventory that the workshop panel may have omitted. The instructions to the remote panel can be found in Appendix C. There was strong agreement between the remote panel and the workshop panel. The remote panel only identified one task that should be clarified. One panelist was unfamiliar with four of the tasks. This feedback was included in the development of the field survey as described in the next section.

Field Survey

Field Survey Development

Working with members of the OB/GYN Assessment Committee, Inteleos staff combined results from the remote panel and the initial task inventory from the workshop. The inventory was compared with the existing content outline to verify that no topics were inadvertently omitted and was edited as appropriate. The final task inventory was reviewed by the OB/GYN Assessment Committee and used to build the practice analysis survey.

Field Survey Structure and Instructions to Survey Participants

The field survey was divided into two parts: demographic items and the task inventory items. A screening item was used at the beginning of the survey to ensure only those actively practicing OB/GYN sonography responded to the survey: "*Do you currently perform and/or teach **OB/GYN** ultrasound examinations?*" Participants who selected "No" were thanked for their time and their survey ended.

For the task inventory portion of the field survey, participants were asked to rate each task on scales of importance. The instructions for this section were:

> *In the next section of the survey, you will be examining tasks associated with being an **OB/GYN** Sonographer, and consider the following question:*
>
> ***How important** is this task to the practice of OB/GYN Sonography…*
>
> - *Absolutely essential*
> - *Very important*
> - *Of average importance*
> - *Of little importance*
> - *Not important at all*

The rating scale and weighting calculations are described in the *Data Analysis* section below.

Survey Administration Procedure and Response Rate

The survey was initially sent to a random sample of 3,000 RDMS registrants who are certified in OB/GYN. The survey was open from January 15-29, 2021. The survey was available to participants as a web-based survey through the survey platform Qualtrics®. All responses to the survey were kept confidential. 400 individuals completed the task inventory portion of the survey. Responses from participants who did not complete the task inventory were not used as part of the data analysis.

RESULTS

Data Analysis

Task Inventory Analysis

Each option for the 113 task inventory items was assigned the following *importance score*:

- Absolutely essential = 5
- Very important = 4
- Of average importance = 3
- Of little importance = 2
- Not important at all = 1

The mean importance score was calculated for each task (see Appendix D). Tasks were assigned to three categories to assist in the discussion of importance scores. The following instructions were provided to the committee:

- **Green:** Any task with an importance score of four or above. The committee was instructed that these tasks should only be removed from the outline if they are redundant or for some other extraordinary circumstance. A rationale must be provided if the task is recommended for removal.
- **Yellow:** Tasks with an importance score of less than four and greater than or equal to three. These tasks may be kept or removed. A rationale is required for any tasks that are removed.
- **Red:** Any task with an importance score lower than three. These tasks should be considered for removal. A rationale is required for any of these tasks that are kept.

Most of the OB/GYN tasks fell into the "green" category. Ten tasks fell into the "yellow" category and there were no "red" category tasks.

Initial Domain Weightings

The mean importance scores for each task were summed within each domain. The sum of the mean importance score for each domain was divided by the total mean importance score to determine the initial domain weightings (Table 1).

Table 1. Initial Domain Weightings (Prior to Committee Call)

Domain	# Tasks	Importance Sum	Initial Domain Weightings
GYN Anatomy and Physiology	22	98.53	19%
OB First Trimester	13	60.13	12%
OB 2nd and 3rd Trimester	39	181.33	36%
Protocols	23	102.37	20%
Physics and Instrumentation	11	44.69	9%
Treatment	5	20.54	4%
Total	*113*	*508*	*100%*

Demographic Analysis

Responses to demographic questions were also analyzed. Appendix E contains highlights from the demographic analysis. The analysis shows the survey respondents are representative across the dimensions of gender identification, age, location, and primary job function. The demographic analysis also provided information regarding years of experience, volume of exams performed, and the degree to which the participants' work is devoted to Obstetrics and to Gynecology.

Discussion of Results

A conference call was held on February 17, 2021 with six members of the OB/GYN Assessment Committee and members of Inteleos staff. Prior to the call, the results of the data analysis and initial content outline weightings were shared with the assessment committee. During the call, the attendees reviewed the tasks and mean importance score, focusing on the 11 tasks with importance scores less than four. The committee recommended removing five tasks. Four of these tasks were in the yellow category. One task the committee recommended removing was a green task, however the committee felt like it was very similar to another task on the outline and would be redundant to keep it. The committee suggested some minor changes to the wording of tasks. All edits, comments, rationales, and decisions from the committee can be found in Appendix D.

The *Treatment* Domain had a low domain weighting and only five tasks. The committee recommended moving the five tasks from this domain to the *Protocols* Domain under the subdomain of *Sonographer Role in Procedures*. They also recommended changing the name of the domain to *Protocols and Procedures* to accommodate this change. The associated importance weightings were added to this domain. The committee reviewed and approved the new domain weightings (Table 2) which reflect the changes outlined above. After the call new names for the domains were suggested and approved by the committee. Original domain names are in parenthesis for reference.

Table 2. Final Committee Recommended Domain Weightings and New Domain Names

Domain (Original Domain Name)	# Tasks	Importance Sum	% of Total
GYN Anatomy and Physiology (Gynecology - Pelvic Anatomy and Physiology)	20	90.46	19%
Obstetrics - First Trimester (OB First Trimester)	13	60.13	12%
Obstetrics Second/Third Trimester (OB 2nd and 3rd Trimester)	39	181.33	37%
Protocols and Procedures	26	115.62	24%
Physics and Instrumentation	10	41.16	8%

FINAL CONTENT OUTLINE

The revised formatted content outline including domain weightings was provided to the OB/GYN Assessment Committee for final review and approval. This report, including the final version of the content outline recommended by the Assessment Committee will go to the ARDMS Council for approval. Upon approval of the content outline, this report will be amended to include the approval date. The final recommended content outline can be found in Appendix F.

Council Approval
(Added 3/17/2021) Content outline was approved and will be used for the 2021 form building process (ARDMS Council Resolution 21401).

Appendix A: Practice Analysis Panelists

Table 3. Workshop Panel

First Name	*Last Name*	*Certifications*
Michael	Bork	MD
Tania	Campbell	RDMS (OBGYN, AB, BR); RVT
Kacy	Jasper	RDMS (OBGYN, AB)
Kelly	Jordan	RDMS (OBGYN, AB), RVT
Trisha	Lennox	RDMS (OBGYN, AB, BR)
Lisa	Linhart	RDMS (OBGYN, AB, BR, VT); RVT
Amanda	McCullough	RDMS (OBGYN, AB); RDCS
Stephen	McGlade	RDMS (OBGYN, AB, Fem)
Helen	Michaels	RDMS (OBGYN,AB, BR); RDCS
Cara	Vickery	RDMS (OBGYN, BR)
Winslow (Ted)	Whitten	RDMS (OBGYN, AB, PS); RVT
Janette	Wybo	RDMS (OBGYN, AB, BR); RDCS; RVT

Table 4. Remote Panel

First Name	*Last Name*	*Certifications*
Sarah	Miller	RDMS (OBGYN, AB, BR)
Alexis	Christopher	RDMS (OBGYN)
Amy	Hatchner	RDMS (OBGYN, AB)

Table 5. Gender Identification of Population and Panelists

Gender	*Percent in Population*	*Panelists*	*Percent of Panelists*
Female	92 %	12	80%
Male	8 %	3	20 %

Table 6. U.S. Region or Country of Population and Panels

Region/Country	*Percent in Population*	*Panelists*	*Percent of Panelists*
Midwest	21%	5	33.3 %
Northeast	17%	1	6.7 %
South	33%	4	26.7 %
West	20%	4	26.7 %
Canada	8%	1	6.7 %
Other	1%	0	0%

Appendix B: Workshop Agenda

Practice Analysis Workshop for OBGYN Exam
May 30-31, 2019
Meeting Location:
Inteleos, 1401 Rockville Pike, Suite 600, Rockville, MD 20852

Thursday, May 30

8:00 – 8:30 AM	Breakfast	
8:30 – 9:00 AM	Welcome and Housekeeping: • Wi-Fi Access • Introductions	Hannah Gibson & Panel
9:00 - 9:30 AM	Overview and Purpose of Workshop	Joe Costa
9:30 – 10:00 AM	Review Preliminary Report • How the data will be used • Feedback • Item Bank Health • Gap Analysis	Joe Costa
10:00 AM – 2:00 PM	Review & Revise the Prepared Task Inventory	Joe Costa & Panel
12:00 – 1:00 PM	Lunch	
1:00 – 2:00 PM	Review Task Inventory in Qualtrics	Panel
2:00 – 4:30 PM	Finalize Task Inventory	Joe Costa & Panel

Friday, May 31

8:00 – 8:30 AM	Breakfast	
8:30 – 12:00 PM	Knowledge-to-Task Linkage Exercise	Joe Costa & Panel
12:00 – 1:00 PM	Lunch	
1:00 PM – 4:30 PM	Item Development Workshop	Hannah Gibson

Panel Members

- Michael Bork
- Tania Campbell
- Kacy Jasper
- Kelly Jordan
- Lisa Linhart
- Trisha Lennox
- Amanda McCullough
- Stephen McGlade
- Helen Michaels
- Cara Vickery
- Ted Whitten
- Janette Wybo

Inteleos Staff

- Joe Costa, Research Scientist
- Hannah Gibson, Senior Exam Program Manager

Appendix C: Instructions for Remote Panel

Instructions Regarding Clarity of Statements:

You are about to review 31 statements that reflect job responsibilities of a diagnostic medical sonographer certified in OB/GYN. Each statement will be presented one at a time.

After you have read the statement, use your expert judgement to choose the most appropriate option. Each statement will be preceded with this phrase: "Would you expect a diagnostic medical sonographer certified in OBGYN to." The framework below is an example.

Would you expect a diagnostic medical sonographer certified in OB/GYN to: ***[STATEMENT WILL APPEAR HERE].***

You will have the following options:

Yes, this statement is accurate and clear.
No, this statement is inaccurate or unclear.
I believe this task is not performed by a diagnostic medical sonographer who is certified in OBGYN.
I am unfamiliar with this task.

Guidelines on how to select the appropriate option

You should choose **option 1** if the statement is an accurate reflection of a job responsibility for a sonographer certified in OB/GYN. You should also choose option 1 if after reading the statement, the meaning of the statement is clear and you would reasonably expect any sonographer certified in OB/GYN to interpret this statement correctly.

You should choose **option 2** if the statement is inaccurate. For example, in your expert opinion, you might believe that rewording the statement will make it more accurate. You should also choose option 2 if the statement is unclear. If you choose this statement, you believe that a sonographer certified in OB/GYN will have difficulty interpreting the meaning of this statement. Note, if you select option 2, you will be given the opportunity to make the statement more accurate or more clear.

You should choose **option 3** if you believe the statement is *outside* the scope of practice for a sonographer certified in OB/GYN. For example, you can choose this statement if another employee (e.g., physician) would perform this statement but not a sonographer.

You should choose **option 4** if you are unfamiliar with the task or uncomfortable making a judgment of the task.

Instructions Regarding Missing or Redundant Information:

First, please review the entire task list in the image below. Then, below the image, select the box next to the statements that you believe are true.

☐ There are tasks, performed by a diagnostic medical sonographer who is certified in OB/GYN missing from the picture above. (1)

☐ There are duplicate or redundant tasks in the picture above. (2)

If either option was selected, an open-ended text box was provided with the following prompt:

You indicated that there are missing tasks or redundant information. Please provide more detail in the box below. Which tasks would you add? Or what redundant information would you remove?

Appendix D: Task Importance Score and Committee Decision

Tasks in the "Green" category have a mean importance score of four or greater. Tasks in the "Yellow" category have a mean importance score of greater than or equal to three and less than four. Tasks in the "Red" category have a mean importance score of less than three. In general, all "green" tasks are kept, and "red" tasks are removed. The committee's decisions are recorded above (column D shows if they decided to keep it and column E shows any edits to the task and rationales for removing tasks.

A. Tasks	B. Domain & Task	C. Importance Value	D. Keep?	E. Cmte. Comment or Rationale
	Gynecology - Pelvic Anatomy and Physiology			
	Normal Anatomy and Physiology			
1	Assess the uterus (i.e., size, position, orientation, contour, echogenicity)	4.83	Yes	
2	Assess the myometrium	4.64	Yes	
3	Assess the endometrium (i.e., cyclic changes)	4.69	Yes	
4	Assess the vagina and cervix	4.30	Yes	
5	Assess both adnexa (i.e., ovaries, fallopian tubes, pelvic musculature)	4.81	Yes	
6	Assess the anterior and posterior cul-de-sacs	4.32	Yes	
7	Assess premenarcheal, reproductive, and postmenopausal patients	4.44	Yes	
	Abnormal Physiology and Perfusion			
8	Evaluate for Müllerian duct developmental anomalies (e.g., septated, subseptate, arcuate, bicornuate, unicornis uterus)	4.22	Yes	
9	Evaluate for abnormal fluid collections (e.g., hydrometra, pyometra, hydrometrocolpos, hematometrocolpos, free fluid)	4.56	Yes	Added free fluid as an example
10	Evaluate for uterine leiomyomas (e.g., intramural, submucosal, subserosal, pedunculated)	4.53	Yes	
11	Evaluate for adenomyosis and endometriosis (e.g., endometrioma)	4.42	Yes	
12	Evaluate for endometrial pathology (e.g., endometrial fluid, polyps, endometrial hyperplasia, endometrial carcinoma)	4.77	Yes	
13	Evaluate for cervical pathology (e.g., polyps, nabothian cysts, cervical stenosis, cervical carcinoma)	4.38	Yes	
14	Evaluate for vaginal pathology (e.g., Gartner cyst, imperforate hymen, hematometra)	3.81	No	Covered in Task 9

15	Evaluate other uterine findings (e.g., caesarean-section scar, leiomyosarcoma)	4.17	Yes	
16	Evaluate for functional ovarian cysts (e.g., follicular, corpus luteum, theca-lutein)	4.20	Yes	
17	Evaluate for benign ovarian neoplasms (e.g., paraovarian, cystadenoma [serous, mucinous, papillary], cystic teratoma, fibroma, thecoma, arrhenoblastoma)	4.57	Yes	
18	Evaluate for malignant ovarian neoplasms (e.g., serous carcinoma, mucinous cystadenocarcinoma, papillary cystadenocarcinoma, metastatic, Krukenberg)	4.80	Yes	
19	Evaluate other ovarian findings (e.g., ovarian torsion, ovarian hyperstimulation syndrome, polycystic ovarian disease)	4.78	Yes	
20	Evaluate for free fluid in the pelvis	4.27	No	Covered in Task 9
21	Assess for pelvic inflammatory disease (e.g., endometritis, pyosalpinx, tubo-ovarian abscess)	4.50	Yes	
22	Assess for intrauterine contraceptive device (IUCD) location	4.54	Yes	
	Obstetrics - First Trimester			
	Normal Anatomy and Physiology First Trimester			
23	Identify structures in the first trimester obstetrical exam less than 10 weeks (i.e., decidual reaction, gestational sac, yolk sac, embryo, amnion)	4.82	Yes	
24	Identify fetal anatomy in the first trimester obstetrical examination between 10-14 weeks' gestation (i.e., calvarium, brain, stomach, cord insertion, limbs)	4.32	Yes	
25	Identify multiple gestations (i.e., fetal number, chorionicity/amnionicity)	4.84	Yes	
	First Trimester Abnormalities and Complications			
26	Evaluate for gestational trophoblastic disease	4.62	Yes	
27	Evaluate for ectopic and heterotopic pregnancy	4.92	Yes	
28	Evaluate for embryonic/fetal demise	4.84	Yes	
29	Evaluate for anembryonic pregnancy	4.75	Yes	
30	Evaluate for abnormal yolk sac	4.39	Yes	
31	Evaluate for increased nuchal translucency	4.46	Yes	
32	Evaluate for subchorionic hemorrhage	4.33	Yes	
33	Evaluate for intrauterine contraceptive device (IUCD) with pregnancy	4.60	Yes	
34	Evaluate for incomplete/missed abortion, and retained products of conception	4.75	Yes	

35	Assess for first trimester congenital anomalies and aneuploidy markers (e.g., Trisomy 13, 18, 21, Turner syndrome, triploidy)	4.50	Yes	
	Obstetrics Second/Third Trimester			
	Normal Anatomy and Physiology - Second/Third Trimester			
36	Assess the placenta (i.e., size, location)	4.75	Yes	
37	Assess the umbilical cord (e.g., placental insertion, vessel number, fetal insertion)	4.73	Yes	
38	Assess amniotic fluid volume	4.70	Yes	
39	Assess fetal lie, presentation, and situs	4.58	Yes	
40	Assess the fetal heart (i.e., size, position, axis, chambers, valves, four-chamber view, left ventricular outflow tract [LVOT], right ventricular outflow tract [RVOT], aortic arch, ductal arch, three vessel view [3VV] and three-vessel trachea [3VT] view)	4.76	Yes	
41	Assess the neck	4.34	Yes	
42	Assess the cranial anatomy (e.g., choroid plexus, lateral cerebral ventricles, midline falx, corpus callosum, cisterna magna, posterior fossa, cavum septi pellucidi, cerebellum, posterior fossa, and nuchal fold)	4.79	Yes	
43	Assess the face (e.g., nose, lips, chin, palate, nasal bone, orbits, frontal bone, profile view)	4.71	Yes	
44	Assess the diaphragm	4.66	Yes	
45	Assess the thorax (i.e., thymus, lungs)	4.29	Yes	
46	Assess the abdomen and gastrointestinal system (i.e., gallbladder, stomach, bowel, adrenal glands, liver, spleen)	4.53	Yes	
47	Assess the skeletal system (e.g., skull, cranial contour, long bones, ribs, ossification)	4.61	Yes	
48	Assess the vertebral spine (e.g., ossification centers, curvature, skin covering)	4.71	Yes	
49	Assess the upper and lower extremities (i.e., number, position, digits and spacing)	4.50	Yes	
50	Assess the genitalia	3.90	Yes	Committee thought this was important to ID pathologies
51	Assess the genitourinary system (e.g., kidneys, bladder)	4.72	Yes	
	Fetal Abnormalities - Second/Third Trimester			"Congenital anomalies"

				changed to abnormalities
52	Assess abnormal multiple gestations (e.g., discordant growth >20%, twin to twin transfusion syndrome, selective intrauterine growth restriction [SIUGR], twin reversed arterial perfusion sequence [TRAP], twin anemia polycythemia sequence [TAPS], conjoined twins)	4.78	Yes	
53	Evaluate for 2nd and 3rd trimester congenital anomalies and aneuploidy markers (e.g., Trisomy 13, 18, 21, Turner syndrome, triploidy)	4.72	Yes	"Assess" changed to "Evaluate"
54	Evaluate for abnormal amniotic fluid volume	4.75	Yes	
55	Evaluate for abnormal fetal growth (e.g., macrosomia, fetal growth restriction [FGR], small for gestation age [SGA])	4.79	Yes	"intrauterine growth restriction (IUGR)" changed to "fetal growth restriction (FGR)" example
56	Evaluate for abnormal central nervous system (e.g., ventriculomegaly, anencephaly, acrania, hydranencephaly, holoprosencephaly, Dandy-Walker malformation, Chiari II malformation, agenesis of corpus callosum, encephalocele, meningocele, myelomeningocele, sacrococcygeal teratoma)	4.80	Yes	
57	Evaluate for abnormal face (cleft lip/palate, hyper-/hypo-telorism, micrognathia, frontal bossing)	4.68	Yes	
58	Evaluate for abnormal neck (e.g., goiter, cystic hygroma)	4.59	Yes	
59	Evaluate for abnormal fetal heart (e.g., atrial and ventricular septal defects, atrioventricular canal defect, tetralogy of Fallot, transposition of the great vessels, pentalogy of Cantrell, pericardial effusion, rhabdomyoma)	4.77	Yes	
60	Evaluate for abnormal diaphragm (e.g., congenital diaphragmatic hernia, eventration)	4.69	Yes	
61	Evaluate for abnormal thorax (e.g., hydrops, pleural effusion, congenital pulmonary adenomatoid malformation, pulmonary sequestration, bronchogenic cyst)	4.65	Yes	
62	Evaluate for abdominal wall defect (e.g., omphalocele, gastroschisis)	4.75	Yes	

63	Evaluate for abnormal abdomen and gastrointestinal system (i.e., ascites, hydrops, neuroblastoma, echogenic bowel, bowel obstruction, esophageal and duodenal atresia, mesenteric cyst)	4.71	Yes	"Assess" changed to "Evaluate"
64	Evaluate for abnormal genitourinary system (e.g., hydronephrosis, cystic renal dysplasia, hydroureter, renal agenesis, bladder outlet obstruction, ureterocele, ambiguous genitalia, ovarian cyst)	4.73	Yes	
65	Evaluate for abnormal skeletal system (e.g., vertebral spine, skeletal dysplasia, demineralization, limb reduction, agenesis)	4.73	Yes	
66	Evaluate for abnormal extremities including hands and feet (e.g., polydactyly, talipes, syndactyly, clinodactyly)	4.47	Yes	
	Placental and umbilical cord abnormalities			
67	Evaluate for placenta previa (i.e., complete, low-lying)	4.87	Yes	Removed "partial" as i.e.
68	Evaluate for placenta abruption and infarction (i.e., retroplacental, marginal)	4.84	Yes	added comma between retroplacental and marginal
69	Evaluate for abnormal placental attachment (i.e., placenta accreta, increta, percreta)	4.79	Yes	changed "e.g." to "i.e."
70	Evaluate for abnormal placental membrane attachment, insertion, or shape (e.g., circumvallate, succenturiate, velamentous, accessory lobe, vasa previa)	4.69	Yes	
71	Evaluate for other placental and membrane abnormalities (e.g., thickened placenta, chorioangioma, amniotic bands, synechia, premature rupture of membranes)	4.65	Yes	"Assess" changed to "Evaluate"
72	Evaluate for abnormal umbilical cord (e.g., single umbilical artery, nuchal cord, allantoic cysts, length)	4.64	Yes	
	Cervix and maternal pathology			
73	Evaluate for cervical incompetence (e.g., shortening, funneling, and cerclage)	4.79	Yes	"Assess" changed to "Evaluate"
74	Evaluate for maternal pelvic pathology (e.g., ovarian cysts, cystic teratoma, pelvic kidney)	4.21	Yes	"Assess" changed to "Evaluate"

	Protocols and Procedures			Added "Procedures" to domain title because moved original "Treatment" Domain to a subdomain under this. Task weightings were added to this domain
	Clinical standards and guidelines			
75	Verify accuracy of physician order and obtain pertinent clinical history from the patient and/or medical records	4.74	Yes	
76	Correlate ultrasound findings with clinical presentation, previous imaging, and lab results (e.g., hCG levels, genetic testing, CA 125)	4.64	Yes	
77	Utilize appropriate scanning technique and patient preparation (i.e., transabdominal, transvaginal, and translabial)	4.77	Yes	Added "i.e."
78	Recognize ultrasound findings that require immediate action (e.g., ovarian torsion, fetal demise, ectopic pregnancy)	4.94	Yes	
	Measurement Techniques - Gynecology			
79	Measure endometrium thickness	4.63	Yes	
80	Measure uterus and ovaries	4.52	Yes	
	Measurement Techniques - Obstetric			
81	Measure first trimester structures (i.e., crown rump length, mean sac diameter, yolk sac)	4.84	Yes	
82	Measure nuchal translucency	4.26	Yes	
83	Measure the nasal bone	3.73	No	Covered by Tasks 35 and 43
84	Measure biparietal diameter	4.70	Yes	
85	Measure head circumference	4.75	Yes	
86	Measure cisterna magnum	4.42	Yes	
87	Measure transverse cerebellar diameter	4.36	Yes	
88	Measure lateral cerebral ventricle	4.45	Yes	
89	Obtain cephalic index	4.09	Yes	
90	Measure nuchal fold between 15 and 20 weeks' gestation	4.06	Yes	

91	Measure orbits, inner and outer orbital diameters	3.57	No	Covered by Tasks 35 and 43
92	Measure abdominal circumference	4.77	Yes	
93	Measure long bones (i.e., femur, humerus, fibula, radius, ulna, tibia)	4.56	Yes	
94	Measure renal pelves	4.00	Yes	Committee thought this is important
95	Measure amniotic fluid (i.e., amniotic fluid index, maximum vertical pocket)	4.65	Yes	
96	Perform biophysical profile	4.38	Yes	
97	Measure maternal cervix	4.58	Yes	
	Physics and Instrumentation			
	Hemodynamics - Gynecology			
98	Assess uterine vasculature with Doppler	3.54	No	Covered by Task 99
99	Assess pelvic vasculature with Doppler (e.g., ovarian perfusion, uterine varices)	4.25	Yes	Added examples
100	Assess arteriovenous malformations using Doppler	4.03	Yes	
	Hemodynamics - Obstetric			
101	Assess embryonic and/or fetal heart rate and rhythm with M-mode or cine clip	4.83	Yes	
102	Identify the middle cerebral artery with Doppler	3.68	Yes	Important to include; changed "assess" to "identify"
103	Identify the ductus venosus with Doppler	3.63	Yes	Important to include; changed "assess" to "identify"
104	Assess the umbilical cord vessels with Doppler	4.14	Yes	
	Imaging Instruments			
105	Utilize M-mode	4.72	Yes	Changed "apply" to "utilize"
106	Utilize Doppler (i.e., color, power, pulsed-wave)	4.20	Yes	Changed "apply" to "utilize"
107	Utilize 3-D imaging	3.00	Yes	Important to include; changed

				"perform" to "utilize"
108	Apply ALARA principle (e.g., thermal index, mechanical index)	4.68	Yes	
	Treatment			Moved to be a subdomain in "Protocols and Procedures" Domain
	Sonographer Role in Procedures			
109	Provide ultrasound assistance and documentation for sonohysterography	4.23	Yes	Changed "guidance" to "assistance"
110	Provide ultrasound assistance for amniocentesis after 15 weeks' gestation	4.26	Yes	Changed "guidance" to "assistance"
111	Provide ultrasound assistance for chorionic villus sampling	4.19	Yes	Changed "guidance" to "assistance"
112	Provide ultrasound assistance for intrauterine contraceptive device placement procedure	3.73	Yes	Important to include; Changed "guidance" to "assistance"
113	Provide ultrasound assistance and documentation for infertility examinations and procedures	4.14	Yes	Changed "guidance" to "assistance"

Appendix E: Demographics of Survey Respondents

Figure 1. Gender Identification of Population Compared to Survey Respondents

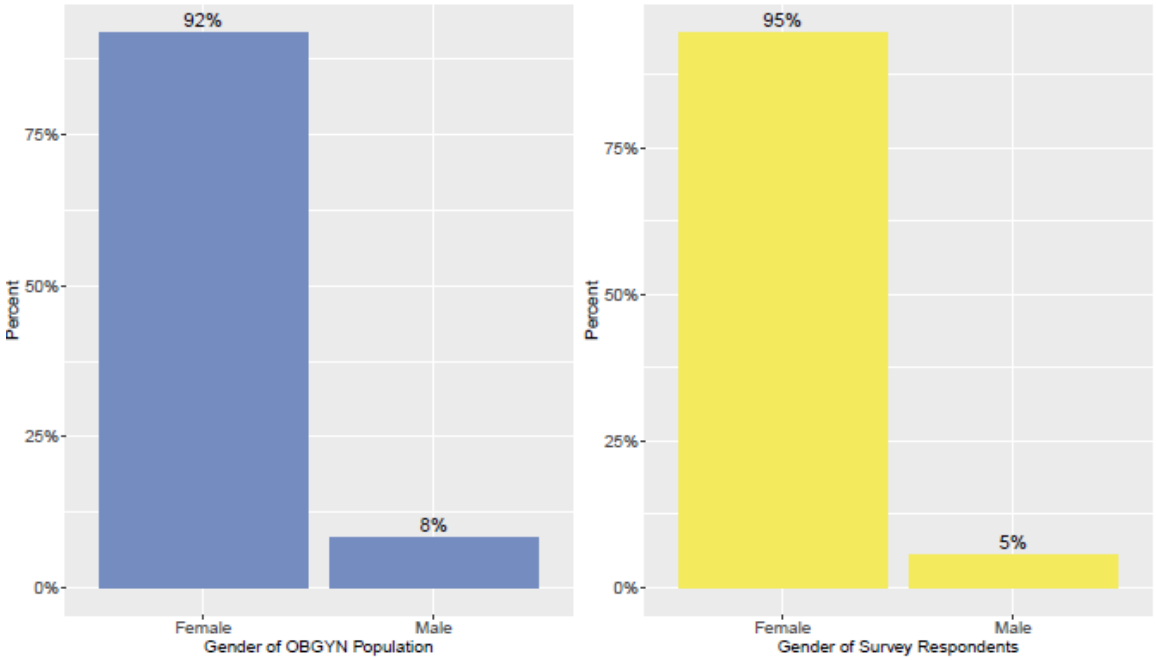


Figure 2. Age of Population Compared to Survey Respondents

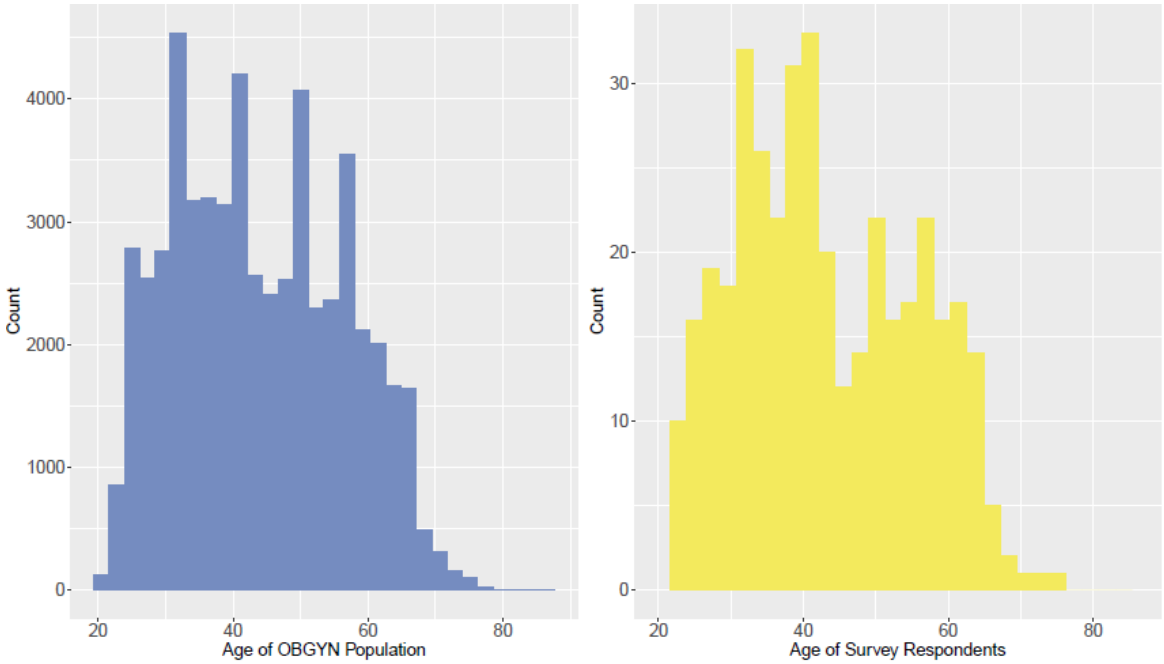


Figure 3. Comparison of Country of Residence for Population and of Survey Respondents

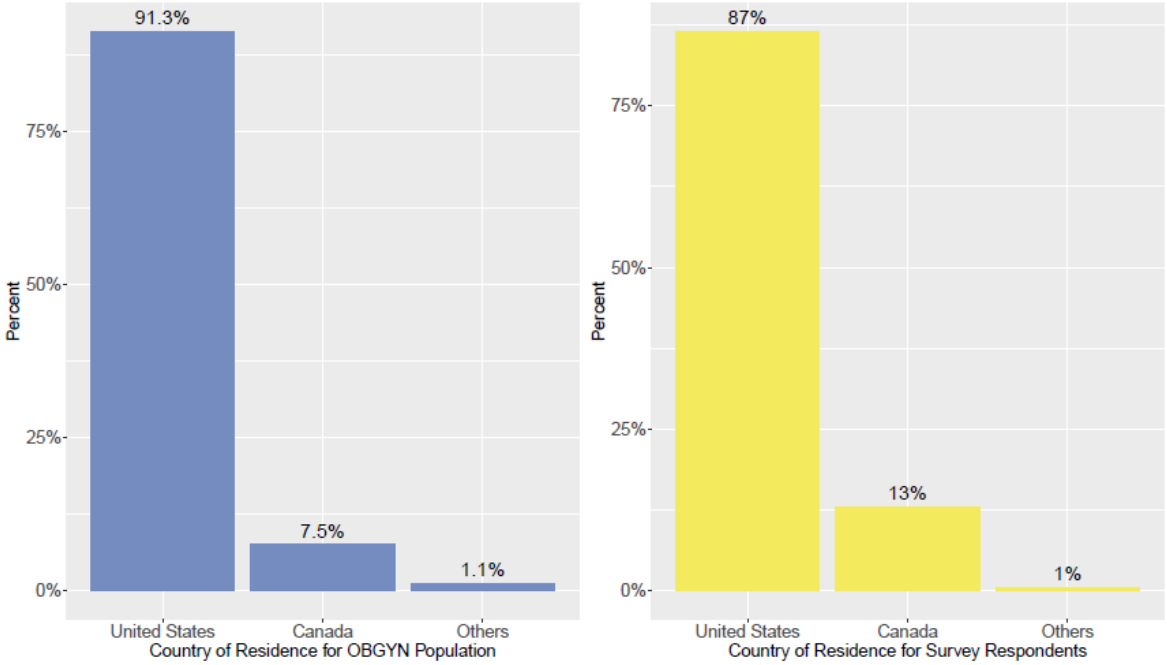


Figure 4. Comparison of U.S. Census Region of Population and Survey Respondents

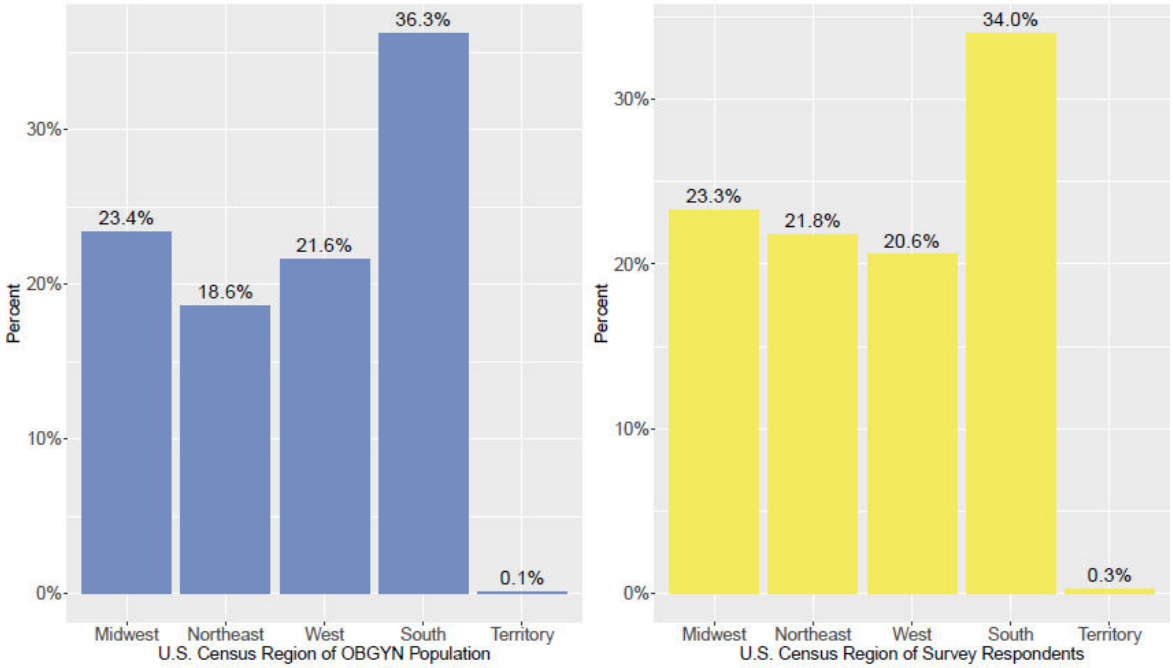


Figure 5. Primary Job Function of Population

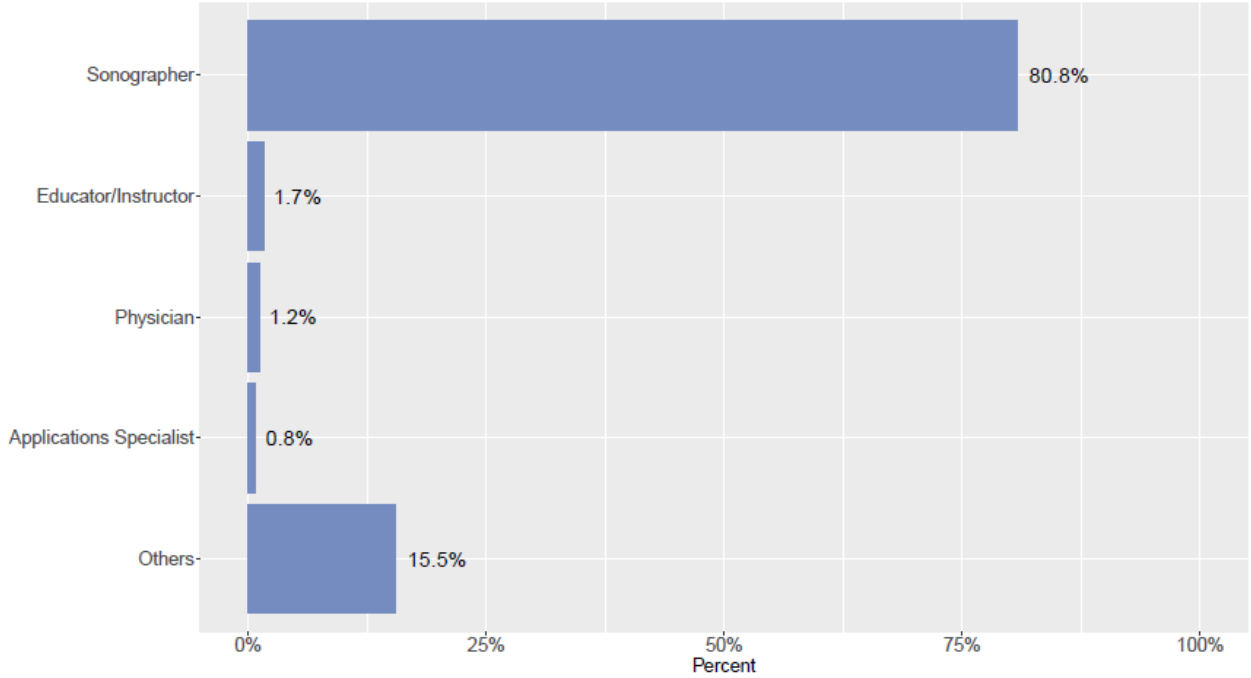


Figure 6. Primary Job Function of Survey Respondents

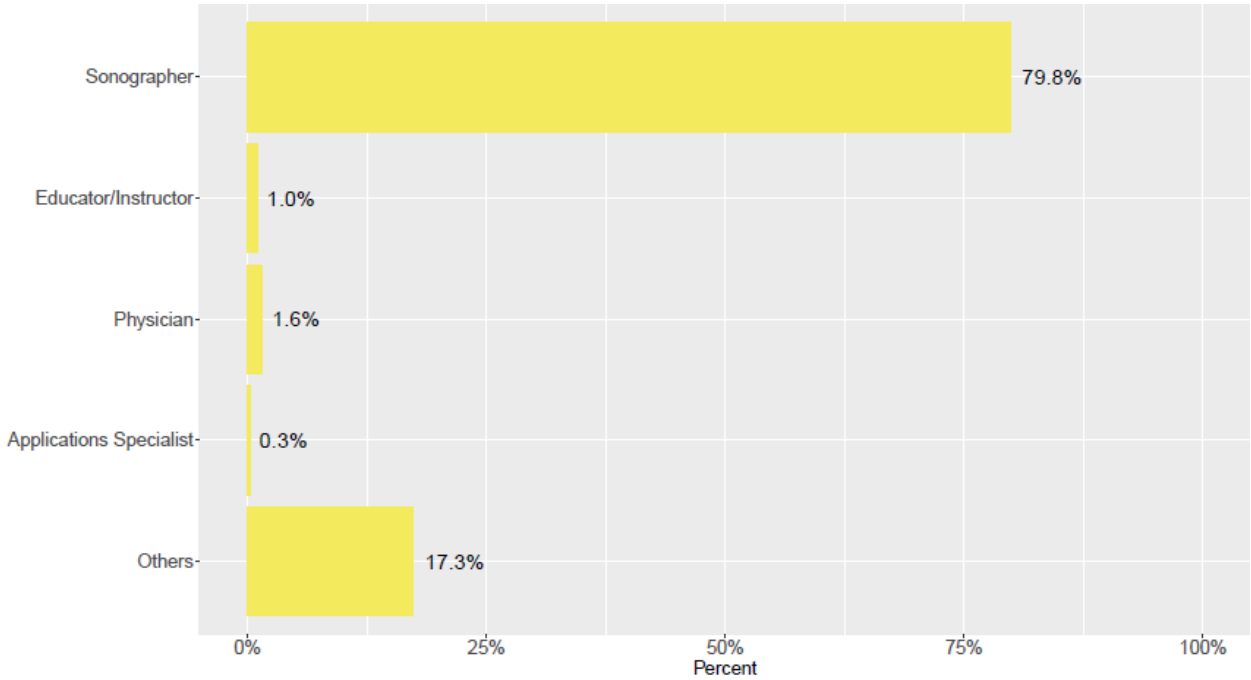


Figure 7. Survey Respondents Years of Performing OB/GYN Ultrasound Examination

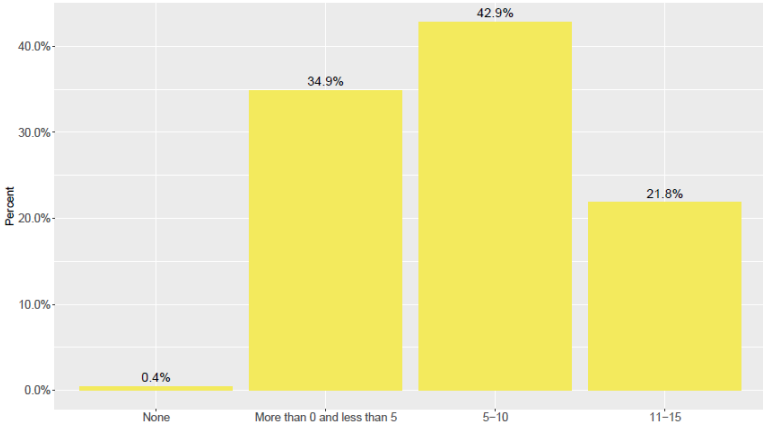


Figure 8. Survey Respondents Number of OB/GYN Exams per Month

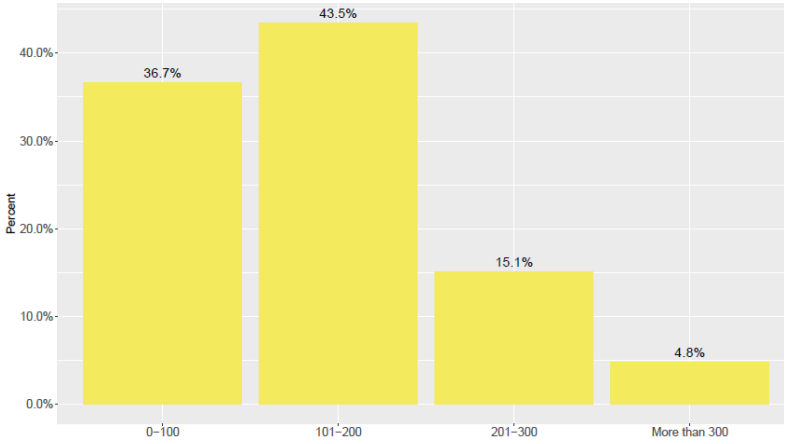
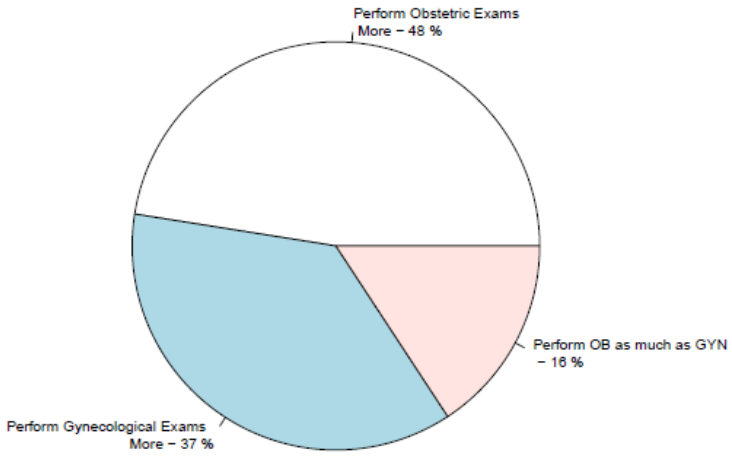


Figure 9. Do Survey Participants Perform Obstetrical or Gynecological Exams More Often?



Appendix G: Content Outline

Obstetrics and Gynecology Examination Content Outline
(Outline Summary)

#	Domain	Subdomain	Percentage
1	**Gynecology - Pelvic Anatomy and Physiology**	▪ Normal Anatomy and Physiology ▪ Abnormal Physiology and Perfusion	**19%**
2	**Obstetrics - First Trimester**	▪ Normal Anatomy and Physiology First Trimester ▪ First Trimester Abnormalities and Complications	**12%**
3	**Obstetrics Second/Third Trimester**	▪ Normal Anatomy and Physiology - Second/Third Trimester ▪ Fetal Abnormalities - Second/Third Trimester ▪ Placental and Umbilical Cord Abnormalities ▪ Cervix and Maternal Pathology	**37%**
4	**Protocols and Procedures**	▪ Clinical Standards and Guidelines ▪ Measurement Techniques - Gynecology ▪ Measurement Techniques - Obstetric ▪ Sonographer Role in Procedures	**24%**
5	**Physics and Instrumentation**	▪ Hemodynamics - Gynecology ▪ Hemodynamics - Obstetric ▪ Imaging Instruments	**8%**

(Detailed Outline)

1.	**Gynecology - Pelvic Anatomy and Physiology 19%**
1.A.	***Normal Anatomy and Physiology***
1.A.1.	Assess the uterus (i.e., size, position, orientation, contour, echogenicity)
1.A.2.	Assess the myometrium
1.A.3.	Assess the endometrium (i.e., cyclic changes)
1.A.4.	Assess the vagina and cervix
1.A.5.	Assess both adnexa (i.e., ovaries, fallopian tubes, pelvic musculature)
1.A.6.	Assess the anterior and posterior cul-de-sacs
1.A.7.	Assess premenarcheal, reproductive, and postmenopausal patients

1.B.	***Abnormal Physiology and Perfusion***
1.B.1.	Evaluate for Müllerian duct developmental anomalies (e.g., septated, subseptate, arcuate, bicornuate, unicornis uterus)
1.B.2.	Evaluate for abnormal fluid collections (e.g., hydrometra, pyometra, hydrometrocolpos, hematometrocolpos, free fluid)
1.B.3.	Evaluate for uterine leiomyomas (e.g., intramural, submucosal, subserosal, pedunculated)
1.B.4.	Evaluate for adenomyosis and endometriosis (e.g., endometrioma)
1.B.5.	Evaluate for endometrial pathology (e.g., endometrial fluid, polyps, endometrial hyperplasia, endometrial carcinoma)
1.B.6.	Evaluate for cervical pathology (e.g., polyps, nabothian cysts, cervical stenosis, cervical carcinoma)
1.B.7.	Evaluate other uterine findings (e.g., caesarean-section scar, leiomyosarcoma)
1.B.8.	Evaluate for functional ovarian cysts (e.g., follicular, corpus luteum, theca-lutein)
1.B.9.	Evaluate for benign ovarian neoplasms (e.g., paraovarian, cystadenoma [serous, mucinous, papillary], cystic teratoma, fibroma, thecoma, arrhenoblastoma)
1.B.10.	Evaluate for malignant ovarian neoplasms (e.g., serous carcinoma, mucinous cystadenocarcinoma, papillary cystadenocarcinoma, metastatic, Krukenberg)
1.B.11.	Evaluate other ovarian findings (e.g., ovarian torsion, ovarian hyperstimulation syndrome, polycystic ovarian disease)
1.B.12.	Assess for pelvic inflammatory disease (e.g., endometritis, pyosalpinx, tubo-ovarian abscess)
1.B.13.	Assess for intrauterine contraceptive device (IUCD) location
2.	**Obstetrics - First Trimester 12%**
2.A.	***Normal Anatomy and Physiology First Trimester***
2.A.1.	Identify structures in the first-trimester obstetric examination at less than 10 weeks' gestation (i.e., decidual reaction, gestational sac, yolk sac, embryo, amnion)
2.A.2.	Identify fetal anatomy in the first trimester obstetrical examination between 10-14 weeks' gestation (i.e., calvarium, brain, stomach, cord insertion, limbs)
2.A.3.	Identify multiple gestations (i.e., fetal number, chorionicity/amnionicity)
2.B.	***First Trimester Abnormalities and Complications***
2.B.1.	Evaluate for gestational trophoblastic disease
2.B.2.	Evaluate for ectopic and heterotopic pregnancy
2.B.3.	Evaluate for embryonic/fetal demise
2.B.4.	Evaluate for anembryonic pregnancy
2.B.5.	Evaluate for abnormal yolk sac
2.B.6.	Evaluate for increased nuchal translucency
2.B.7.	Evaluate for subchorionic hemorrhage
2.B.8.	Evaluate for intrauterine contraceptive device (IUCD) with pregnancy
2.B.9.	Evaluate for incomplete/missed abortion, and retained products of conception
2.B.10.	Assess for first trimester congenital anomalies and aneuploidy markers (e.g., Trisomy 13, 18, 21, Turner syndrome, triploidy)

3.	Obstetrics Second/Third Trimester 37%
3.A.	***Normal Anatomy and Physiology - Second/Third Trimester***
3.A.1.	Assess the placenta (i.e., size, location)
3.A.2.	Assess the umbilical cord (e.g., placental insertion, vessel number, fetal insertion)
3.A.3.	Assess amniotic fluid volume
3.A.4.	Assess fetal lie, presentation, and situs
3.A.5.	Assess the cranial anatomy (e.g., choroid plexus, lateral cerebral ventricles, midline falx, corpus callosum, cisterna magna, posterior fossa, cavum septi pellucidi, cerebellum, posterior fossa, and nuchal fold)
3.A.6.	Assess the neck
3.A.7.	Assess the face (e.g., nose, lips, chin, palate, nasal bone, orbits, frontal bone, profile view)
3.A.8.	Assess the fetal heart (i.e., size, position, axis, chambers, valves, four-chamber view, left ventricular outflow tract [LVOT], right ventricular outflow tract [RVOT], aortic arch, ductal arch, three vessel view [3VV] and three-vessel trachea [3VT] view)
3.A.9.	Assess the thorax (i.e., thymus, lungs)
3.A.10.	Assess the diaphragm
3.A.11.	Assess the abdomen and gastrointestinal system (i.e., gallbladder, stomach, bowel, adrenal glands, liver, spleen)
3.A.12.	Assess the genitourinary system (e.g., kidneys, bladder)
3.A.13.	Assess the skeletal system (e.g., skull, cranial contour, long bones, ribs, ossification)
3.A.14.	Assess the vertebral spine (e.g., ossification centers, curvature, skin covering)
3.A.15.	Assess the upper and lower extremities (i.e., number, position, digits and spacing)
3.A.16.	Assess the genitalia
3.B.	***Fetal Abnormalities - Second/Third Trimester***
3.B.1.	Assess abnormal multiple gestations (e.g., discordant growth >20%, twin to twin transfusion syndrome, selective intrauterine growth restriction [SIUGR], twin reversed arterial perfusion sequence [TRAP], twin anemia polycythemia sequence [TAPS], conjoined twins)
3.B.2.	Evaluate for 2nd and 3rd trimester congenital anomalies and aneuploidy markers (e.g., Trisomy 13, 18, 21, Turner syndrome, triploidy)
3.B.3.	Evaluate for abnormal amniotic fluid volume
3.B.4.	Evaluate for abnormal fetal growth (e.g., macrosomia, fetal growth restriction [FGR], small for gestation age [SGA])
3.B.5.	Evaluate for abnormal central nervous system (e.g., ventriculomegaly, anencephaly, acrania, hydranencephaly, holoprosencephaly, Dandy-Walker malformation, Chiari II malformation, agenesis of corpus callosum, encephalocele, meningocele, myelomeningocele, sacrococcygeal teratoma)
3.B.6.	Evaluate for abnormal neck (e.g., goiter, cystic hygroma)
3.B.7.	Evaluate for abnormal face (cleft lip/palate, hyper-/hypotelorism, micrognathia, frontal bossing)
3.B.8.	Evaluate for abnormal fetal heart (e.g., atrial and ventricular septal defects, atrioventricular canal defect, tetralogy of Fallot, transposition of the great vessels, pentalogy of Cantrell, pericardial

	effusion, rhabdomyoma)
3.B.9.	Evaluate for abnormal diaphragm (e.g., congenital diaphragmatic hernia, eventration)
3.B.10.	Evaluate for abnormal thorax (e.g., hydrops, pleural effusion, congenital pulmonary adenomatoid malformation, pulmonary sequestration, bronchogenic cyst)
3.B.11.	Evaluate for abdominal wall defect (e.g., omphalocele, gastroschisis)
3.B.12.	Evaluate for abnormal abdomen and gastrointestinal system (i.e., ascites, hydrops, neuroblastoma, echogenic bowel, bowel obstruction, esophageal and duodenal atresia, mesenteric cyst)
3.B.13.	Evaluate for abnormal genitourinary system (e.g., hydronephrosis, cystic renal dysplasia, hydroureter, renal agenesis, bladder outlet obstruction, ureterocele, ambiguous genitalia, ovarian cyst)
3.B.14.	Evaluate for abnormal skeletal system (e.g., vertebral spine, skeletal dysplasia, demineralization, limb reduction, agenesis)
3.B.15.	Evaluate for abnormal extremities including hands and feet (e.g. polydactyly, talipes, syndactyly, clinodactyly)
3.C.	***Placental and Umbilical Cord Abnormalities***
3.C.1.	Evaluate for placenta previa (i.e., complete, low-lying)
3.C.2.	Evaluate for placenta abruption and infarction (i.e., retroplacental, marginal)
3.C.3.	Evaluate for abnormal placental attachment (i.e., placenta accreta, increta, percreta)
3.C.4.	Evaluate for abnormal placental membrane attachment, insertion, or shape (e.g., circumvallate, succenturiate, velamentous, accessory lobe, vasa previa)
3.C.5.	Evaluate for other placental and membrane abnormalities (e.g., thickened placenta, chorioangioma, amniotic bands, synechia, premature rupture of membranes)
3.C.6.	Evaluate for abnormal umbilical cord (e.g., single umbilical artery, nuchal cord, allantoic cysts, length)
3.D.	***Cervix and Maternal Pathology***
3.D.1.	Evaluate for cervical incompetence (e.g., shortening, funneling, and cerclage)
3.D.2.	Evaluate for maternal pelvic pathology (e.g., ovarian cysts, cystic teratoma, pelvic kidney)
4.	**Protocols and Procedures 24%**
4.A.	***Clinical Standards and Guidelines***
4.A.1.	Verify accuracy of physician order and obtain pertinent clinical history from the patient and/or medical records
4.A.2.	Correlate ultrasound findings with clinical presentation, previous imaging, and lab results (e.g., hCG levels, genetic testing, CA 125)
4.A.3.	Utilize appropriate scanning technique and patient preparation (i.e., transabdominal, transvaginal, and translabial)
4.A.4.	Recognize ultrasound findings that require immediate action (e.g., ovarian torsion, fetal demise, ectopic pregnancy)
4.B.	***Measurement Techniques - Gynecology***
4.B.1.	Measure endometrium thickness
4.B.2.	Measure uterus and ovaries
4.C.	***Measurement Techniques - Obstetric***

4.C.1.	Measure first trimester structures (i.e., crown rump length, mean sac diameter, yolk sac)
4.C.2.	Measure nuchal translucency
4.C.3.	Measure biparietal diameter
4.C.4.	Measure head circumference
4.C.5.	Measure cisterna magnum
4.C.6.	Measure transverse cerebellar diameter
4.C.7.	Measure lateral cerebral ventricle
4.C.8.	Obtain cephalic index
4.C.9.	Measure nuchal fold between 15 and 20 weeks' gestation
4.C.10.	Measure abdominal circumference
4.C.11.	Measure long bones (i.e., femur, humerus, fibula, radius, ulna, tibia)
4.C.12.	Measure renal pelves
4.C.13.	Measure amniotic fluid (i.e., amniotic fluid index, maximum vertical pocket)
4.C.14.	Perform biophysical profile
4.C.15.	Measure maternal cervix
4.D.	***Sonographer Role in Procedures***
4.D.1.	Provide ultrasound assistance and documentation for sonohysterography
4.D.2.	Provide ultrasound assistance for amniocentesis after 15 weeks' gestation
4.D.3.	Provide ultrasound assistance for chorionic villus sampling
4.D.4.	Provide ultrasound assistance for intrauterine contraceptive device placement
4.D.5.	Provide ultrasound assistance and documentation for infertility examinations and procedures
5.	**Physics and Instrumentation 8%**
5.A.	***Hemodynamics - Gynecology***
5.A.1.	Assess pelvic vasculature with Doppler (e.g., ovarian perfusion, uterine varices)
5.A.2.	Assess arteriovenous malformations using Doppler
5.B.	***Hemodynamics - Obstetric***
5.B.1.	Assess embryonic and/or fetal heart rate and rhythm with M-mode or cine clip
5.B.2.	Identify the middle cerebral artery with Doppler
5.B.3.	Identify the ductus venosus with Doppler
5.B.4.	Assess the umbilical cord vessels with Doppler
5.C.	***Imaging Instruments***
5.C.1.	Utilize M-mode
5.C.2.	Utilize Doppler (i.e., color, power, pulsed-wave)
5.C.3.	Utilize 3-D imaging
5.C.4.	Apply ALARA principle (e.g., thermal index, mechanical index)