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Infertility Workup for the Women's Health Specialist

ABSTRACT: *Infertility*, defined as failure to achieve pregnancy within 12 months of unprotected intercourse or therapeutic donor insemination in women younger than 35 years or within 6 months in women older than 35 years, affects up to 15% of couples. An infertility evaluation may be offered to any patient who by definition has infertility or is at high risk of infertility. Women older than 35 years should receive an expedited evaluation and undergo treatment after 6 months of failed attempts to become pregnant or earlier, if clinically indicated. In women older than 40 years, more immediate evaluation and treatment are warranted. If a woman has a condition known to cause infertility, the obstetrician–gynecologist should offer immediate evaluation. Essential components of an initial workup include a review of the medical history, physical examination, and additional tests as indicated. For the female partner, tests will focus on ovarian reserve, ovulatory function, and structural abnormalities. Imaging of the reproductive organs provides valuable information on conditions that affect fertility. Imaging modalities can detect tubal patency and pelvic pathology and assess ovarian reserve. Male factor is a cause of infertility in 40–50% of couples. Given the high prevalence of male factor in infertile heterosexual couples, a basic medical history and evaluation of the male partner are warranted from the outset. A women's health specialist may reasonably obtain the male partner's medical history and order the semen analysis. It is also reasonable to refer all male infertility patients to a specialist with expertise in male reproductive medicine. Unexplained infertility may be diagnosed in as many as 30% of infertile couples. At a minimum, these patients should have evidence of ovulation, tubal patency, and a normal semen analysis.

Recommendations and Conclusions

The American College of Obstetricians and Gynecologists (ACOG) and the American Society for Reproductive Medicine (ASRM) make the following recommendations and conclusions:

- An infertility evaluation may be offered to any patient who by definition has infertility or is at high risk of infertility.
- Women older than 35 years should receive an expedited evaluation and undergo treatment after 6 months of failed attempts to become pregnant or earlier, if clinically indicated. In women older than 40 years, more immediate evaluation and treatment are warranted. If a woman has a condition known to cause infertility, the obstetrician–gynecologist should offer immediate evaluation.
- A comprehensive medical history, including items relevant to the potential etiologies of infertility, should be obtained from the patient and partner, should one exist.
- A targeted physical examination of the female partner should be performed with a focus on vital signs and include a thyroid, breast, and pelvic examination.
- For the female partner, tests will focus on ovarian reserve, ovulatory function, and structural abnormalities.
- Imaging of the reproductive organs provides valuable information on conditions that affect fertility. Imaging modalities can detect tubal patency and pelvic pathology and assess ovarian reserve.

- A women's health specialist may reasonably obtain the male partner's medical history and order the semen analysis. Alternatively, it is also reasonable to refer all male infertility patients to a health care specialist with expertise in male reproductive medicine.

Background

Infertility, defined as failure to achieve pregnancy within 12 months of unprotected intercourse or therapeutic donor insemination in women younger than 35 years or within 6 months in women older than 35 years, (1, 2) affects up to 15% of couples (3). It is common for an infertile woman initially to seek care from her obstetrician–gynecologist. The basic infertility evaluation is summarized in Table 1. An infertility evaluation may be offered to any patient who by definition has infertility or is at high risk of infertility. Women older than 35 years should receive an expedited evaluation and undergo treatment after 6 months of failed attempts to become pregnant or earlier, if clinically indicated. In women older than 40 years, more immediate evaluation and treatment are warranted (4). Additionally, if a woman has a condition known to cause infertility, the obstetrician–gynecologist should offer immediate evaluation (1). Indications for immediate evaluation include the following:

- oligomenorrhea or amenorrhea
- known or suspected uterine, tubal, or peritoneal disease
- stage III or stage IV endometriosis and
- known or suspected male infertility

This Committee Opinion focuses on the evaluation of opposite-sex couples; for information on family building for lesbian, gay, bisexual, transgender, queer, intersex, asexual, and gender nonconforming individuals, see ACOG Committee Opinion No. 749, *Marriage and Family Building Equality for Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual, and Gender Nonconforming Individuals* and ASRM's *Access to Fertility Treatment by Gays, Lesbians, and Unmarried Persons* (5, 6).

Prepregnancy Counseling and Evaluation

Prepregnancy care is important to reduce the risk of adverse health effects for the woman, fetus, and neonate by working with the woman to optimize health, address modifiable risk factors, and provide education about healthy pregnancy. The American College of Obstetricians and Gynecologists and ASRM provide an overview of prepregnancy counseling and recommendations for counseling, infectious disease screening, immunization, genetic counseling and screening, and more in Committee Opinion No. 762, *Prepregnancy Counseling* (7). This also is the opportunity to educate women about methods to maximize fertility, including timing and frequency of intercourse.

Female Factor Infertility

The obstetrician–gynecologist often is the first health care provider women will seek for evaluation or concerns about fertility. Essential components of an initial workup include a review of the medical history, physical examination, and additional tests as indicated.

Table 1. Basic Infertility Evaluation

Female		
History		
Physical		
Prepregnancy evaluation*		
Additional evaluation for etiology of infertility	Diminished ovarian reserve	• Antimüllerian hormone or basal follicle-stimulating hormone plus estradiol • Transvaginal ultrasonography with antral follicle count
	Ovulatory dysfunction	Ovulatory function test (eg, serum progesterone measurement)
	Tubal factor	• Hysterosalpingography • Hysterosalpingo-contrast sonography
	Uterine factor	• Transvaginal ultrasonography • Sonohysterography • Hysteroscopy • Hysterosalpingography
Male		
History		
Semen analysis		

*See the following document for guidance on prepregnancy evaluation: Prepregnancy counseling. ACOG Committee Opinion No. 762. American College of Obstetricians and Gynecologists. Obstet Gynecol 2019;133:e78–89.

History

A comprehensive medical history, including items relevant to the potential etiologies of infertility, should be obtained from the patient and partner, should one exist. Key historical factors to elicit from the patient include the following (3):

- duration of infertility and results of any previous evaluation and treatment
- menstrual history (including age at menarche, cycle interval, length, and characteristics; presence of molimina [mild premenstrual symptoms and changes]; and onset and severity of dysmenorrhea), signs of ovulation including positive ovulation tests, cervical mucus changes, or biphasic basal body temperatures
- pregnancy history (gravidity, parity, time to pregnancy, fertility treatments, pregnancy outcome, delivery route, and associated complications)
- previous methods of contraception
- coital frequency and timing
- sexual dysfunction
- past surgery (procedures, indications, and outcomes) focused on abdominal and pelvic procedures
- previous hospitalizations, serious illnesses, or injuries
- gynecologic history (eg, pelvic inflammatory disease, sexually transmitted infections, endometriosis, leiomyomas)
- sexual history
- review of organ systems, including history of thyroid disease, galactorrhea, hirsutism, pelvic or abdominal pain, and dyspareunia
- previous abnormal cervical cancer screening tests and any subsequent treatment
- current medications and supplements, with an emphasis on identifying allergies and potential teratogens
- family history of birth defects, developmental delay, early menopause, or reproductive problems
- occupation and exposure to known environmental hazards and
- use of nicotine products, alcohol, and recreational or illicit drugs

Physical Examination

A targeted physical examination of the female partner should be performed with a focus on vital signs and include a thyroid, breast, and pelvic examination. Key physical factors include the following (3):

- weight, body mass index, blood pressure, and pulse
- thyroid enlargement and presence of any nodules or tenderness
- breast secretions and their character
- signs of androgen excess
- tanner staging of breasts and pubic and axillary hair
- vaginal or cervical abnormality, secretions, or discharge
- pelvic or abdominal tenderness, organ enlargement, or masses
- uterine size, shape, position, and mobility
- adnexal masses or tenderness and
- cul-de-sac masses, tenderness, or nodularity

Additional Evaluation for Etiology of Infertility

The infertility workup includes laboratory and imaging tests. For the female partner, tests will focus on ovarian reserve, ovulatory function, and structural abnormalities. Certain fertility tests have a low yield in identifying modifiable diagnoses, do not distinguish women who will and will not become pregnant, add significant expense, or are associated with harms that outweigh demonstrable benefit (Box 1). Although there may be other reasons for these tests to be done, they are low yield for infertility evaluation. Imaging of the reproductive organs provides valuable information on conditions that affect fertility. Imaging modalities can detect tubal patency and pelvic pathology and assess ovarian reserve.

Diminished Ovarian Reserve

The reproductive potential of the ovaries, termed ovarian reserve, represents the number of oocytes available for potential fertilization at that point in time

Box 1. Infertility Tests That Should Not Be Routinely Ordered

- Laparoscopy for unexplained infertility
- Advanced sperm function testing (eg, DNA fragmentation testing)
- Postcoital testing
- Thrombophilia testing
- Immunologic testing
- Karyotype
- Endometrial biopsy
- Prolactin

Adapted from American Society for Reproductive Medicine. Choosing Wisely: ten things physicians and patients should question. Philadelphia (PA): ABIM Foundation; 2015. Available at: http://www.choosingwisely.org/wp-content/uploads/2015/02/ASRM-Choosing-Wisely-List.pdf. Retrieved December 4, 2018.

and may be assessed by serum tests or ultrasonography. The presence of decreased ovarian reserve predicts future response to ovarian stimulation (8). The results of ovarian reserve tests should be considered in the context of the patient's age. Although there are no definitive criteria for diminished ovarian reserve, the following values may be considered consistent with diminished ovarian reserve:

- antimüllerian hormone (AMH) value less than 1 ng/mL
- antral follicle count less than 5–7 and
- follicle-stimulating hormone (FSH) greater than 10 IU/L or
- a history of poor response to in vitro fertilization stimulation (fewer than four oocytes at time of egg retrieval).

Ovarian reserve can be assessed by measuring estradiol and FSH between cycle days 2–5. Follicle-stimulating hormone values greater than 10 IU/L are associated with a less robust response to ovarian stimulation (9). Estradiol serves as an aid for interpreting FSH results. Basal estradiol levels typically should be less than 60–80 pg/mL; elevated estradiol levels may have a suppressive effect on FSH levels and are indicative of decreased ovarian reserve (3). Serum AMH is produced by the granulosa cells of antral follicles and, therefore, is another serum marker of ovarian reserve. Because AMH levels remain relatively stable throughout the menstrual cycle, they can be assessed on any day of the menstrual cycle (10, 11). Antimüllerian hormone is similar to antral follicle count in its ability to predict response to ovarian stimulation and pregnancy in infertile women (12). Ovarian reserve tests are good predictors of response to ovarian stimulation, but poor results do not necessarily predict inability to achieve a live birth (3, 13, 14). If a woman has unexplained ovarian insufficiency or failure or an elevated FSH level before age 40 years, fragile X carrier screening is recommended to determine whether she has an *FMR1* premutation (15).

Ultrasonographic assessment of the antral follicle count is determined by the number of follicles that measure 2–10 mm in both ovaries. *Low antral follicle count* may be defined as fewer than 5–7 follicles and is associated with poor response to ovarian stimulation (16). However, antral follicle count is a relatively poor predictor of future ability to become pregnant. Antral follicle counts may be elevated in women with polycystic ovary syndrome (PCOS) or depressed in those women with hypothalamic amenorrhea or those using certain hormonal contraceptives (17).

Ovulatory Dysfunction

Ovulatory dysfunction (defined as a history of oligomenorrhea or amenorrhea or as luteal progesterone levels repeatedly less than 3 ng/mL, or both) accounts for a significant proportion of female infertility (18). For many women, menstrual history may be enough to assess ovulatory function. Clinical history can be used to assess ovulatory cycles because most ovulatory women will have regular menstrual cycles every 25–35 days accompanied by moliminal symptoms (3). However, up to one third of women with normal menstrual cycles are anovulatory; therefore, confirmation of ovulation should be considered (19). Objective quantification of ovulation also can be obtained with a midluteal progesterone measurement, positive luteinizing hormone tests, biphasic basal body temperatures, or cervical mucus changes. A progesterone value greater than 3 ng/mL is evidence of ovulation (20). Progesterone production from a postovulatory corpus luteum is dependent on luteal hormone stimulation and is, therefore, highly pulsatile above this minimal threshold of 3 ng/mL (21). Because luteal serum progesterone levels can fluctuate by sevenfold over a few hours, a single progesterone value greater than 3 ng/mL should be used to confirm ovulation and not to assess the quality of the luteal phase (3, 21).

Anovulation may be related to obesity, hypothalamic and pituitary dysfunction, PCOS, and other etiologies. Polycystic ovary syndrome is the most common cause of ovulatory infertility (22, 23). There is no universally accepted definition of PCOS; however, it may be diagnosed based on the National Institutes of Health, Rotterdam, or Androgen Excess and PCOS Society criteria (24–26). Although many women with PCOS will present with a chief report of infertility, obstetrician–gynecologists and other gynecologic care providers should be mindful of other potential health risks. Women in whom PCOS has been diagnosed are at increased risk of metabolic syndrome, related adverse cardiovascular events, and poor pregnancy outcomes (27). All women in whom PCOS is diagnosed should be screened for metabolic syndrome with measurements of waist circumference, blood pressure, fasting lipid panel, and glucose tolerance testing.

Thyroid disease and hyperprolactinemia can cause ovulatory dysfunction, ranging from an inadequate luteal phase to oligo-ovulation to amenorrhea. Serum thyrotropin should be measured in women with ovulatory dysfunction, infertile women, or those with signs of thyroid disease. Serum prolactin should be measured in infertile women with irregular menses or other signs and symptoms of hyperprolactinemia.

Tubal Factor

Hysterosalpingography (HSG), a procedure used to view the uterus and fallopian tubes by injecting radiopaque contrast through the cervix during fluoroscopy, is most commonly used for determination of tubal patency. Proximal and distal tubal occlusion, peritubal adhesions, and salpingitis isthmica nodosa may be seen with HSG. The positive predictive value and negative predictive value of HSG for assessing tubal patency have been

estimated as 38% and 94%, respectively (28). Given the low positive predictive value, an HSG that demonstrates nonpatency may require further evaluation to confirm tubal occlusion (3).

Sonohysterography is the visualization of the uterus and adnexa ultrasonographically with the infusion of fluid through a transcervical catheter (29). An extension of sonohysterography, hysterosalpingo-contrast sonography determines tubal patency with the use of fluid through a transcervical catheter. The technique often uses a contrast agent with air bubbles to aid in identification of the tubes, which are not usually seen ultrasonographically. There are no U.S. Food and Drug Administration-approved contrast agents for hysterosalpingo-contrast sonography; however, studies have been performed using agents such as perflutren lipid microspheres and sulfur hexafluoride lipid-type A microsphere, as well as agitated saline. The accuracy of hysterosalpingo-contrast sonography may be more dependent on operator experience than HSG. The sensitivity of hysterosalpingo-contrast sonography for determination of tubal patency ranges from 76% to 96%, although the specificity ranges from 67% to 100% (30, 31). The role of contrast sonohysterography in determining tubal patency is evolving as more data on its use are available.

Uterine Factor

Uterine factors associated with infertility include endometrial polyps, synechiae, müllerian anomalies, and leiomyomas. Leiomyomas with a surgically modifiable effect on fertility include those with a submucous or endometrial cavity-distorting component (32). Myomectomy generally is not advised to improve pregnancy outcomes in asymptomatic infertile women with noncavity-distorting myomas (32). Using sonohysterography, the uterine cavity usually is easily defined, and abnormalities such as endometrial polyps, submucosal fibroids, and intrauterine adhesions can be seen. More than 16% of infertile women and 40% of women with abnormal uterine bleeding will have an abnormality on sonohysterography (33). Sonohysterography has a sensitivity and specificity of 91% and 84%, respectively, for the detection of intrauterine structures that may be polyps or leiomyomas (34). Transvaginal ultrasonography aids in detection of uterine leiomyomas that affect the uterine cavity. Size, number, and location of uterine leiomyomas can be determined with sonohysterography, which may aid in planning fertility treatment. Use of three-dimensional ultrasonography improves detection of müllerian anomalies and is comparable to pelvic magnetic resonance imaging in diagnostic accuracy for this condition (35).

Direct visualization of the uterine cavity by hysteroscopy provides the most definitive method for diagnosis of endometrial polyps, uterine synechiae, and submucosal fibroids. Hysteroscopy is not as commonly used for initial evaluation of women with infertility because of cost and access considerations. Additionally, other methods of uterine cavity assessment, such as ultrasonography, offer the advantage of concurrent imaging of the adnexa. Hysteroscopy is indicated to confirm and treat intracavitary lesions detected by other imaging modalities.

Hysterosalpingography is limited in its ability to identify uterine cavity masses or adhesions because these structures are not radio-opaque. Thus, HSG relies on visualization of the mass effect of uterine lesions to identify an abnormality. The sensitivity of HSG for uterine cavity polypoid lesions is only 50% (36). Müllerian anomalies can be detected with HSG, although other imaging modalities are needed to differentiate and confirm the final diagnosis. Magnetic resonance imaging and three-dimensional ultrasonography provide more accurate definition of müllerian anomalies.

Male Factor Infertility

Male factor is a cause of infertility in 40–50% of couples (37). Given the high prevalence of male factor in infertile heterosexual couples, a basic medical history and evaluation of the male partner are warranted from the outset. The minimal evaluation of the male partner includes a reproductive history and semen analysis (38) (Table 2). A women's health specialist may reasonably obtain the male partner's medical history and order the semen analysis. Alternatively, it is also reasonable to refer all male infertility patients to a health care specialist with expertise in male reproductive medicine. Any abnormality noted on the male history or semen analysis warrants referral to a specialist trained in male infertility (eg, a reproductive urologist or reproductive endocrinologist) for a complete evaluation (38).

History

The following list details the specific key male historical factors to elicit (38):

- coital frequency and timing
- any evidence of sexual dysfunction, including erectile or ejaculation issues
- duration of infertility
- prior fertility
- childhood illness and developmental history
- systemic medical illness
- previous surgery (eg, cryptorchidism with or without surgery)
- medication use, including anabolic steroids and supplements (eg, testosterone), and allergies
- sexual history and sexually transmitted infections and
- exposure to gonadal trauma or toxins.

Table 2. The World Health Organization's Accepted Reference Values for Semen Analysis, 2010

Parameter (Units)	Reference Value (Lower Limits, 5th Centile)
Semen volume (mL)	1.5
pH	≥7.2
Sperm concentration (10^6 per mL)	15
Total sperm number (10^6 per ejaculate)	39
Total motility (%)	40
Progressive motility (PR, %)	32
Sperm agglutination	Absent*
Sperm morphology (normal forms, %)	World Health Organization criteria: lower reference limit for normal forms is 4% Tygerberg strict criteria: excellent prognosis (>14% morphologically normal spermatozoa), good prognosis (4–14%) and poor prognosis (<4%)†

*Diagnostic evaluation of the infertile male: a committee opinion. Practice Committee of the American Society for Reproductive Medicine. Fertil Steril 2015;103:e18–25.

†Kruger TF, Acosta AA, Simmons KF, Swanson RJ, Matta JF, Oehninger S. Predictive value of abnormal sperm morphology in in vitro fertilization. Fertil Steril 1988;49:112–7.

Modified from WHO laboratory manual for the examination and processing of human semen. 5th ed, Appendix 1, p. 225, 2010. Available at: http://www.who.int/reproductivehealth/publications/infertility/9789241547789/en/. Retrieved December 4, 2018.

Semen Analysis

Semen analysis is the quantitative microscopic evaluation of sperm parameters. Two to five days of abstinence are optimal before semen analysis. Ideally, the sample is obtained by masturbation in the laboratory collection room. Semen collection at home is possible if the sample is transported at room or body temperature for evaluation within 1 hour. Abnormalities on semen analysis warrant repeat testing and further investigation. Several methods for evaluating semen analysis exist (Table 2).

Unexplained Infertility

Unexplained infertility may be diagnosed in as many as 30% of infertile couples (39). Unexplained infertility occurs when the definition of infertility is met, the basic infertility evaluation is performed, and all the tests results are normal. At a minimum, these patients should have evidence of ovulation, tubal patency, and a normal semen analysis (39).

References

1. Practice Committee of American Society for Reproductive Medicine. Definitions of infertility and recurrent pregnancy loss: a committee opinion. Fertil Steril 2013;99:63.
2. American College of Obstetricians and Gynecologists. reVitalize. Gynecology data definitions (version 1.0). Washington, DC: American College of Obstetricians and Gynecologists; 2017. Available at: https://www.acog.org/-/media/Departments/Patient-Safety-and-Quality-Improvement/reVITALize-Gynecology-Definitons-V1.pdf. Retrieved December 4, 2018.
3. Diagnostic evaluation of the infertile female: a committee opinion. Practice Committee of the American Society for Reproductive Medicine. Fertil Steril 2015;103:e44-50.
4. Female age-related fertility decline. Committee Opinion No. 589. American College of Obstetricians and Gynecologists. Obstet Gynecol 2014;123:719–21.
5. Marriage and family building equality for lesbian, gay, bisexual, transgender, queer, intersex, asexual, and gender nonconforming individuals. ACOG Committee Opinion No. 749. American College of Obstetricians and Gynecologists. Obstet Gynecol 2018;132:e82–6.
6. Access to fertility treatment by gays, lesbians, and unmarried persons: a committee opinion. Ethics Committee of American Society for Reproductive Medicine. Fertil Steril 2013;100:1524–7.
7. Prepregnancy counseling. ACOG Committee Opinion No. 762. American College of Obstetricians and Gynecologists. Obstet Gynecol 2019;133:e78–89.
8. Testing and interpreting measures of ovarian reserve: a committee opinion. Practice Committee of the American Society for Reproductive Medicine. Fertil Steril 2015;103:e9–17.
9. Broekmans FJ, Kwee J, Hendriks DJ, Mol BW, Lambalk CB. A systematic review of tests predicting ovarian reserve and IVF outcome. Hum Reprod Update 2006;12:685–718.
10. La Marca A, Stabile G, Artenisio AC, Volpe A. Serum anti-Mullerian hormone throughout the human menstrual cycle. Hum Reprod 2006;21:3103–7.
11. Gracia CR, Shin SS, Prewitt M, Chamberlin JS, Lofaro LR, Jones KL, et al. Multi-center clinical evaluation of the Access AMH assay to determine AMH levels in reproductive age women during normal menstrual cycles. J Assist Reprod Genet 2018;35:777–83.
12. Broer SL, Mol BW, Hendriks D, Broekmans FJ. The role of antimullerian hormone in prediction of outcome after IVF: comparison with the antral follicle count. Fertil Steril 2009;91:705–14.

13. Scott RT Jr, Elkind-Hirsch KE, Styne-Gross A, Miller KA, Frattarelli JL. The predictive value for in vitro fertility delivery rates is greatly impacted by the method used to select the threshold between normal and elevated basal follicle-stimulating hormone. Fertil Steril 2008;89:868–78.

14. The use of antimüllerian hormone in women not seeking fertility care. Committee Opinion No. 773. American College of Obstetricians and Gynecologists. Obstet Gynecol 2019;133:275–9.

15. Carrier screening for genetic conditions. Committee Opinion No. 691. American College of Obstetricians and Gynecologists. Obstet Gynecol 2017;129:e41–55.

16. Ferraretti AP, La Marca A, Fauser BC, Tarlatzis B, Nargund G, Gianaroli L. ESHRE consensus on the definition of "poor response" to ovarian stimulation for in vitro fertilization: the Bologna criteria. ESHRE working group on Poor Ovarian Response Definition. Hum Reprod 2011;26: 1616–24.

17. D'Arpe S, Di Feliciantonio M, Candelieri M, Franceschetti S, Piccioni MG, Bastianelli C. Ovarian function during hormonal contraception assessed by endocrine and sonographic markers: a systematic review. Reprod Biomed Online 2016;33:436–48.

18. Lindsay TJ, Vitrikas KR. Evaluation and treatment of infertility [published erratum appears in Am Fam Physician 2015;92:437]. Am Fam Physician 2015;91:308–14.

19. Prior JC, Naess M, Langhammer A, Forsmo S. Ovulation prevalence in women with spontaneous normal-length menstrual cycles—a population-based cohort from HUNT3, Norway. PLoS One 2015;10:e0134473.

20. Wathen NC, Perry L, Lilford RJ, Chard T. Interpretation of single progesterone measurement in diagnosis of anovulation and defective luteal phase: observations on analysis of the normal range. Br Med J (Clin Res Ed) 1984;288:7–9.

21. Filicori M, Butler JP, Crowley WF Jr. Neuroendocrine regulation of the corpus luteum in the human. Evidence for pulsatile progesterone secretion. J Clin Invest 1984;73: 1638–47.

22. Polycystic ovary syndrome. ACOG Practice Bulletin No. 194. American College of Obstetricians and Gynecologists. Obstet Gynecol 2018;131:e157–71.

23. Fauser BC, Tarlatzis BC, Rebar RW, Legro RS, Balen AH, Lobo R, et al. Consensus on women's health aspects of polycystic ovary syndrome (PCOS): the Amsterdam ESHRE/ASRM-Sponsored 3rd PCOS Consensus Workshop Group. Fertil Steril 2012;97:28–38.e25.

24. Dunaif A, Chang RJ, Franks S, Legro RS, editors. Polycystic ovary syndrome: current controversies, from the ovary to the pancreas. Totowa (NJ): Humana Press; 2008.

25. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Fertil Steril 2004;81:19–25.

26. Azziz R, Carmina E, Dewailly D, Diamanti-Kandarakis E, Escobar-Morreale HF, Futterweit W, et al. Position statement: criteria for defining polycystic ovary syndrome as a predominantly hyperandrogenic syndrome: an Androgen Excess Society guideline. Androgen Excess Society. J Clin Endocrinol Metab 2006;91:4237–45.

27. Boomsma CM, Eijkemans MJ, Hughes EG, Visser GH, Fauser BC, Macklon NS. A meta-analysis of pregnancy outcomes in women with polycystic ovary syndrome. Hum Reprod Update 2006;12:673–83.

28. Coppus SF, Opmeer BC, Logan S, van der Veen F, Bhattacharya S, Mol BW. The predictive s value of medical history taking and Chlamydia IgG ELISA antibody testing (CAT) in the selection of subfertile women for diagnostic laparoscopy: a clinical prediction model approach. Hum Reprod 2007;22:1353–8.

29. Sonohysterography. Technology Assessment No. 12. American College of Obstetricians and Gynecologists. Obstet Gynecol 2016;128:38–42.

30. Luciano DE, Exacoustos C, Luciano AA. Contrast ultrasonography for tubal patency. J Minim Invasive Gynecol 2014;21:994–8.

31. Maheux-Lacroix S, Boutin A, Moore L, Bergeron ME, Bujold E, Laberge P, et al. Hysterosalpingosonography for diagnosing tubal occlusion in subfertile women: a systematic review with meta-analysis. Hum Reprod 2014;29:953–63.

32. Removal of myomas in asymptomatic patients to improve fertility and/or reduce miscarriage rate: a guideline. Practice Committee of the American Society for Reproductive Medicine. Fertil Steril 2017;108:416–25.

33. Tur-Kaspa I, Gal M, Hartman M, Hartman J, Hartman A. A prospective evaluation of uterine abnormalities by saline infusion sonohysterography in 1,009 women with infertility or abnormal uterine bleeding. Fertil Steril 2006;86:1731–5.

34. Bittencourt CA, Dos Santos Simoes R, Bernardo WM, Fuchs LF, Soares Junior JM, Pastore AR, et al. Accuracy of saline contrast sonohysterography in detection of endometrial polyps and submucosal leiomyomas in women of reproductive age with abnormal uterine bleeding: systematic review and meta-analysis. Ultrasound Obstet Gynecol 2017;50:32–9.

35. Graupera B, Pascual MA, Hereter L, Browne JL, Ubeda B, Rodriguez I, et al. Accuracy of three-dimensional ultrasound compared with magnetic resonance imaging in diagnosis of Mullerian duct anomalies using ESHRE-ESGE consensus on the classification of congenital anomalies of the female genital tract. Ultrasound Obstet Gynecol 2015; 46:616–22.

36. Soares SR, Barbosa dos Reis MM, Camargos AF. Diagnostic accuracy of sonohysterography, transvaginal sonography, and hysterosalpingography in patients with uterine cavity diseases. Fertil Steril 2000;73:406–11.

37. Kumar RM, Shahul S. Role of breast-feeding in transmission of hepatitis C virus to infants of HCV-infected mothers. J Hepatol 1998;29:191–7.

38. Diagnostic evaluation of the infertile male: a committee opinion. Practice Committee of the American Society for Reproductive Medicine. Fertil Steril 2015;103:e18–25.

39. Effectiveness and treatment for unexplained infertility. Practice Committee of the American Society for Reproductive Medicine. Fertil Steril 2006;86(suppl 1):S111–4.

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