



Supplemental Guide: Reproductive Endocrinology and Infertility



A C G M E

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Milestones Supplemental Guide

This document provides additional guidance and examples for the Reproductive Endocrinology and Infertility Milestones. This is not designed to indicate any specific requirements for each level, but to provide insight into the thinking of the Milestone Work Group.

Included in this document is the intent of each Milestone and examples of what a Clinical Competency Committee (CCC) might expect to be observed/assessed at each level. Also included are suggested assessment models and tools for each subcompetency, references, and other useful information.

Review this guide with the CCC and faculty members. As the program develops a shared mental model of the Milestones, consider creating an individualized guide (Supplemental Guide Template available) with institution/program-specific examples, assessment tools used by the program, and curricular components.

Additional tools and references, including the Milestones Guidebook, Clinical Competency Committee Guidebook, and Milestones Guidebook for Residents and Fellows, are available on the [Resources](#) page of the Milestones section of the ACGME website.

Patient Care 1: General Infertility and Evaluation	
Overall Intent: To understand the physician's role in patient intake/evaluation and examination and how to use this information to improve treatment and performance outcomes	
Milestones	Examples
Level 1 <i>Elicits basic medical, obstetric, gynecologic, surgical, family, and social history</i> <i>Performs a basic physical and pelvic examination as indicated for the female partner</i> <i>Discusses factors that may affect treatment-related outcomes and complications</i>	• Identifies medical diagnosis and obstetric/gynecologic/surgical history which may contribute to infertility or predispose to comorbidities once pregnant • Takes a social history regarding contributions to infertility (smoking) and preconceptual maximization of health (alcohol or illicit drug use) • Characterizes the vagina, cervix, uterus, and adnexa via exam looking for physical findings which may contribute to infertility (e.g., cervix deviated laterally, vaginal septum, bicornis cervix, fibroid uterus) • Synthesizes history and exam data
Level 2 <i>Elicits a comprehensive history, incorporating a directed history that identifies potential etiologies of infertility</i> <i>Independently performs and interprets imaging (e.g., hysterosalpingogram [HSG], ultrasound) in the evaluation of infertility</i> <i>Identifies patient-specific factors that may affect treatment-related outcomes and complications</i>	• Takes an obstetric/gynecologic/surgical/mental health history of factors that may contribute to infertility or predispose to comorbidities once pregnant, • Takes a social history regarding contributions to infertility (smoking) and preconceptual maximization of health (alcohol or illicit drug use) • Using ultrasound, evaluates uterine size, shape, endometrial lining, bilateral adnexa, abnormal Mullerian findings, cavity distorting lesions, adnexal findings (size, antral follicle count, cysts) • For an hysterosalpingogram, reports on cavity findings and tubal patency; troubleshoots procedure when necessary for completion • Synthesizes history and exam data with treatment options • Incorporates insurance coverage and financial resources into counseling and treatment planning
Level 3 <i>Develops an evidence-based treatment plan based on a patient's specific history and diagnosis (e.g., age, financial resources, presence of male factor)</i>	• Considers risks of treatment including ovarian hyperstimulation syndrome, failed treatment via stimulation, retrieval, fertilization, or transfer with consideration of age, partner availability, and resources

<i>Integrates diagnostic, laboratory and imaging studies to identify potential etiologies of infertility, including male factor</i>	• Tailors treatment plans with consideration of all factors involved, including treatment modality (outpatient ovulation induction/time intercourse versus intrauterine insemination), surgical correction of abnormal findings, and in vitro fertilization (IVF), with transfer versus consideration for embryo banking or oocyte cryopreservation • Synthesizes history and exam data with diagnosis and treatment options, considering success rates, morbidities, and cost
<i>Treats patient-specific factors that may affect treatment-related outcomes and complications</i>	• Incorporates insurance coverage, current guidelines, and financial resources for treatment planning to a broad population, such as single women
Level 4 <i>Provides subspecialty evaluation and treatment for complex infertility in collaboration with other members of the health care team (e.g., male factor, pituitary disorders)</i> <i>Uses infertility outcomes to improve individual and group practice patterns</i> <i>Incorporates cultural and gender preferences into collaborative advanced treatment planning</i>	• Coordinates multidisciplinary team for treatment, including outpatient clinical/surgical care for male and female partners • Includes consideration of mental/social health maximization • Enables access to financial support/planning • Is aware of local and national treatment modality trends for patient subgroups and applies outcome data to ensure best treatment options are available and in use • Supports unbiased care for all genders, nationalities, and religions when recommending treatment options based on presentation and history/exam/lab findings
Level 5 <i>Evaluates the cost effectiveness of diagnostic testing and management options</i> <i>Develops novel strategies for data evaluation to improve patient care and patient outcomes</i> <i>Uses infertility research to improve national and global practice patterns, develop novel techniques, and improve access to care</i>	• Considers current treatment modalities from outcomes versus cost perspective, in various infertility etiology categories • Contributes to and incorporates new technologies such as artificial intelligence (AI) into evaluation where appropriate • Incorporates large-scale data (Society for Assisted Reproductive Technology (SART), etc.) to evaluate outcomes of current treatment modalities and devise implementation of new technologies for validation and use to improve patient care
Assessment Models or Tools	• Direct observation • Medical record (chart) audit • Patient satisfaction data • Portfolio
Curriculum Mapping	•
Notes or Resources	• Committee on Gynecologic Practice, American Society for Reproductive Medicine (ASRM). ACOG Committee Opinion Number 781: Infertility workup for the women's health specialist. <i>Obstet Gynecol.</i> 2019;133(6):e377-e384.

- https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/infertility_workup_for_the_womens_health_specialist.pdf.
- Fauser BCJM, Tarlatzis BC, Rebar RW, 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(1):28-38. <https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/consensus-on-womens-health-aspects-of-pcos.pdf>.
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 - Practice Committee of the ASRM. Endometriosis and infertility: A committee opinion. *Fertil Steril*. 2012;98(3):591-598. https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/endometriosis_and_infertility.pdf.
 - Practice Committee of the ASRM. Evidence-based treatments for couples with unexplained infertility: A guideline. *Fertil Steril*. 2019;113(2):305-322. https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/evidenece-based_treatments_for_couples_with_unexplained_infertility.pdf.
 - Practice Committee of the ASRM. Removal of myomas in asymptomatic patients to improve fertility and/or reduce miscarriage rate: A guideline. *Fertil Steril*. 2017;108(3):416-425. https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/removal_of_myomas_in_asymptomatic_patients_to_improve_infertlity_and-or_reduce_miscarriage_rate.pdf.
 - Taylor HS, Pal L, Seli E. *Speroff's Clinical Gynecologic Endocrinology and Infertility*. 9th edition. Philadelphia, PA: Wolters Kluwer; 2019. ISBN:978-1451189766.
 - Teede HJ, Misso ML, Costello MF, et al. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. *Fertil Steril*. 2018;110(3):364-379. https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/recs_from_the_international_evidence-based_guideline_for_pcos.pdf.

Patient Care 2: Ovulation Induction and Assisted Reproductive Technologies (ART) Overall Intent: To perform fertility treatment planning and procedures	
Milestones	Examples
Level 1 <i>Identifies basic treatment options utilizing ovulation induction agents (e.g., oral medications)</i> <i>Performs basic gynecologic ultrasounds</i> <i>Identifies broad indications and counsels patients about treatment options</i>	• Identifies use of letrozole for polycystic ovary syndrome (PCOS) or clomiphene citrate with intrauterine insemination for unexplained infertility • Performs first-trimester ultrasound with minimal guidance • Discusses expected outcomes of both clomiphene citrate and letrozole
Level 2 <i>Formulates ovulation induction treatment plan and effectively communicates the mechanism of action and side effects of ovulation-inducing agents</i> <i>Performs basic ultrasound monitoring in patients undergoing OI and ART</i> <i>Discusses therapies involved in the management of assisted reproduction</i>	• Plans timed intercourse with letrozole cycle for young patient with PCOS and counsels on expected side effects, planned monitoring, and risks of multiples with a realistic explanation of the chances of success • Competently performs follicular scans • Reviews indications for intrauterine insemination • Begins to counsel on indications for IVF versus intracytoplasmic spermatozoa injection
Level 3 <i>Develops and manages an appropriate treatment plan for patients undergoing OI and ART, including adjuncts based on indications (e.g., age, ovulatory status, male factor)</i> <i>Proficiently performs procedures associated with OI and ART (e.g., intrauterine insemination (IUI), oocyte retrieval, embryo transfer)</i> <i>Counsels patients to maximize outcomes while minimizing complications from treatment (e.g., number of embryos to transfer for patients undergoing ART)</i>	• Adeptly discusses indications for IVF, intracytoplasmic sperm injection (ICSI) and pre-implantation genetic testing for aneuploidies • Begins to discuss dosing strategies and adjustments • Create basic IVF plans tailored to patient diagnosis and ovarian reserve testing • Uses ASRM guidelines and patient information to counsel and create plan for embryo transfer plan • Performs uncomplicated intrauterine inseminations, oocyte retrievals, and embryo transfers • Thoroughly documents complicated procedures

Level 4 <i>Manages complex cycles, including dose adjustment, cycle counseling, and complications</i> <i>Proficiently performs difficult IUIs and embryo transfers</i> <i>Counsels patients about the outcomes of treatment and discusses other options for treatment and future family planning</i>	• Deliberately adjusts medication and cycle including transition to freeze-all cycle or a gonadotropin releasing hormone (GnRH) agonist trigger • Articulates reasons a patient may wish to change the previously established number of embryos to transfer plan • Uses adjuncts to decrease risks of ovarian hyperstimulation syndrome • Consistently navigates difficult intrauterine inseminations and transfers alongside clear communication of the technique used to do so
Level 5 <i>Develops and disseminates an evidence-based approach to innovative and complex treatment plans for fertility treatment</i> <i>Develops and implements novel procedural interventions to enhance fertility and implantation</i> <i>Develops patient educational tools implemented at a national level</i>	• Develops patient educational tools, including literature, apps, etc. that are used on a national level • Is involved as an instructor in embryo transfer courses • Investigates novel approaches to safe stimulation and trigger in a novel population or setting
Assessment Models or Tools	• Direct observation • Pregnancy rate following intrauterine insemination, and embryo transfer compared to practice mean • Simulation (e.g., intrauterine insemination under ultrasound guidance, ASRM embryo transfer course)
Curriculum Mapping	•
Notes or Resources	• ASRM. Grand Rounds Recorded Webinar: Treatment of Unexplained Infertility: What is the Evidence? (CME). https://store.asrm.org/Learn/GrandRounds. Accessed 2021. • Cirillo F, Patrizio P, Baccini M, et al. The human factor: Does the operator performing the embryo transfer significantly impact the cycle outcome? <i>Human Reproduction</i>. 2020;35(2):275-282. https://academic.oup.com/humrep/article/35/2/275/5758035. • Messinis IE. Ovulation induction: A mini review. <i>Human Reproduction</i>. 2005;20(10):2688-2697. https://academic.oup.com/humrep/article/20/10/2688/603349. • Practice Committee of the ASRM. ASRM standard embryo transfer protocol template: A committee opinion. <i>Fertil Steril</i>. 2017;107(4):897-900.

https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-non-members/asrm_standard_embryo_transfer_template.pdf.

- Practice Committee of the ASRM. Evidence-based treatment for couples with unexplained infertility: A guideline. *Fertil Steril*. 2020;113(2):305-322.
[https://www.fertstert.org/article/S0015-0282\(19\)32484-7/fulltext](https://www.fertstert.org/article/S0015-0282(19)32484-7/fulltext).
- Practice Committee of the ASRM. Guidance on the limits to the number of embryos to transfer: A committee opinion. *Fertil Steril*. 2017;107(4):901-903.
[https://www.fertstert.org/article/S0015-0282\(21\)00563-X/pdf](https://www.fertstert.org/article/S0015-0282(21)00563-X/pdf).
- Verhaeghe C, El Hachem H, Inchboard L, et al. Assessment of operator performance during oocyte retrievals: Residents' learning curve and continuous monitoring of senior physicians. *BMC Med Educ*. 2021;21(193).
<https://bmcmmededuc.biomedcentral.com/articles/10.1186/s12909-021-02615-w>.

Patient Care 3: Surgery for Reproductive Disorders Overall Intent: To perform diagnostic and operative procedures for reproductive disorders including describing the indications and contraindications, complications of, and expected results, as well as perform surgical procedures appropriate to reproductive disorders	
Milestones	Examples
Level 1 <i>Identifies patient-specific diagnostic and operative procedures available for common reproductive disorders</i> <i>Discusses surgical complications</i>	• Discusses available diagnostic surgeries available for evaluation of reproductive disorders (e.g., infertility, pelvic pain, and Mullerian anomalies) including diagnostic laparoscopy, diagnostic hysteroscopy, exploratory laparotomy, and robotic-assisted treatment • Describes operative procedures for common reproductive disorders such as ovarian cystectomy, salpingectomy, fulguration or excision of endometriosis, and treatment of Mullerian anomalies • Describes complications of each diagnostic and operative procedure including bleeding, infection, and specifies what damage can be done to surrounding structures as well as the need for further procedures
Level 2 <i>Selects appropriate diagnostic and operative procedures, both minimally invasive (hysteroscopy, laparoscopy, robotic-assisted) and open (laparotomy) approaches, and assists for common reproductive and developmental disorders</i> <i>Identifies patient-specific risk factors for surgical complications and selects strategies to minimize risk</i>	• Describes indications for each diagnostic and operative procedure and selects the appropriate procedure to treat specific reproductive disorders • Demonstrates the essentials of formulating an operative management plan for reproductive disorders and development disorders • Evaluates coexisting disease or factors, which may have a bearing on selection of surgical procedures to minimize risks to patient
Level 3 <i>Independently performs basic operative procedures, with both minimally invasive and open approaches, demonstrating proficiency</i> <i>Recognizes and develops management strategies for intra- and post-operative complications</i>	• Independently and effectively performs diagnostic laparoscopy and diagnostic hysteroscopy appropriate to reproductive disorders and developmental disorders • Independently performs operative procedures for ovarian cystectomy, salpingectomy, and myomectomy • Cites the principles of the physical and energy modalities used in reproductive surgery • Recognizes intra-operative complications and discuss management strategies
Level 4 <i>Independently and skillfully performs complex operative procedures, demonstrating proficiency with both minimally invasive and open approaches</i>	• Independently performs reproductive surgeries including staging and treatment of endometriosis, resectioning of uterine synechiae and uterine septae, tuboplasty, and resectioning of pelvic adhesions

<i>Comprehensively manages intra- and post-operative surgical complications</i>	• Comprehends and gains experience in assessing the effects of surgical treatment • Discusses the rationale, techniques, and materials available for adhesion prevention • Recognizes surgical complications, including the incidence and prevention of immediate and late complications of reproductive and infertility surgery
Level 5 <i>Performs surgical management of complex reproductive disorders and reconstructive surgery</i> <i>Develops and implements an innovative surgical technique or safer surgical approach for reproductive disorders</i>	• Performs surgical procedures to correct developmental disorders, including all techniques used for neovaginal construction via dilation, correction of imperforate hymen, removal of vaginal and cervical septae, and reconstruction of uterine anomalies (historical and current) • Designs and implements new surgical techniques for infertility or developmental abnormalities • Implement safer surgical approaches for reproductive disorders
Assessment Models or Tools	• Direct observation • Multisource feedback • Simulation
Curriculum Mapping	•
Notes or Resources	• ASRM. Developmental Anomalies of the Urogenital Tract. Continuing medical education (CME) course. https://store.asrm.org/Meet/MeetingDetails/productId/211117?_ga=2.30084799.1023886226.1634831108-657739101.1634831108. Accessed 2021. • ASRM. Grand Rounds Recorded Webinar: Mullerian Variants Part 1. https://store.asrm.org/Learn/GrandRounds. Accessed 2021. • ASRM. Grand Rounds Recorded Webinar: Mullerian Variants Part II. https://store.asrm.org/Learn/GrandRounds. Accessed 2021. • ASRM. Grand Rounds Recorded Webinar: Reproductive Surgery: surgical management of endometriosis and fibroids. https://store.asrm.org/Learn/GrandRounds. Accessed 2021. • Jones HW, Rock JA. <i>Te Linde's Operative Gynecology</i>. 11th edition. Philadelphia, PA: Wolters Kluwer; 2015. ISBN:978-1451177367.

Medical Knowledge 1: Diagnostic Techniques and Treatment Planning for Reproductive Disorders Overall Intent: To understand, interpret, and apply imaging modalities and diagnostic techniques to diagnose disorders across the lifespan	
Milestones	Examples
Level 1 <i>Demonstrates knowledge of basic imaging modalities used to evaluate patients (e.g., abdominal and vaginal ultrasound)</i> <i>Demonstrates knowledge of basic diagnostic techniques used to evaluate patients (e.g., laboratory studies, endometrial biopsy, Tanner staging)</i>	• Demonstrates knowledge of ultrasound imaging to assess antral follicle count and uterine morphology (e.g., abdominal and vaginal ultrasound) • Demonstrates knowledge of evaluation of abnormal uterine bleeding with endometrial biopsy, laboratory testing for ovarian reserve and ovulatory dysfunction • Demonstrates knowledge of physical exam findings relevant to urogenital anomalies, androgen excess disorders, pubertal development disorders (e.g., laboratory studies, endometrial biopsy, Tanner staging)
Level 2 <i>Demonstrates knowledge of advanced imaging modalities used to evaluate patients (e.g., magnetic resonance imaging [MRI], sonohysterogram, HSG)</i> <i>Demonstrates knowledge of advanced diagnostic techniques used to evaluate patients (e.g., hormonal studies, bone age, tumor markers)</i>	• Demonstrates knowledge of advanced methods of imaging to assess tubal patency and complex uterine morphology (fibroids, polyps, adhesions, anomalies) (e.g., magnetic resonance imaging (MRI), sonohysterogram, hysterosalpingogram (HSG)) • Demonstrates knowledge of tests used in evaluation of complex endocrine and reproductive disorders including amenorrhea and premature ovarian insufficiency
Level 3 <i>Applies knowledge of imaging modalities and diagnostic techniques to understand reproductive disorders</i> <i>Develops treatment plans by applying comprehensive knowledge of reproductive disorders, including provocative tests of the reproductive endocrine axis (e.g., cosyntropin stimulation)</i>	• Understands diagnostic techniques to evaluate the hypothalamic-pituitary-adrenal/gonadal axis (e.g., cosyntropin stimulation test, GnRH stimulation test) • Develops a treatment plan for an uncomplicated IVF cycle
Level 4 <i>Integrates knowledge of imaging modalities and diagnostic techniques to diagnose disorders across the lifespan</i>	• Demonstrates knowledge of diagnostic techniques to evaluate pubertal development disorders through evaluation of bone age and hormonal studies • Orders and interprets dual-energy x-ray absorptiometry (DEXA) scan

<i>Develops comprehensive treatment plans, working with the multidisciplinary team, to optimize patient outcomes for patients with reproductive disorders</i>	• Develops thorough treatment plans for complicated clinical scenarios including plans for addressing non-reproductive components of complex disorders (e.g., Turner syndrome, congenital adrenal hyperplasia (CAH), Kallman syndrome)
Level 5 <i>Develops and investigates innovative and evidence-based diagnostic techniques to develop treatment plans for patients with reproductive disorders</i> <i>Develops and implements educational tools for diagnostic techniques for reproductive disorders at a national level</i>	• Researches and develops a novel test or novel application of an existing test to evaluate the hypothalamic-pituitary-ovarian/hypothalamic-pituitary-adrenal axes
Assessment Models or Tools	• Direct observation • Multisource feedback • Simulation assessment
Curriculum Mapping	•
Notes or Resources	• American Institute of Ultrasound in Medicine (AIUM). http://meded.aium.org/. 2021. • Endotext. https://www.endotext.org/. 2021. • Radiopaedia. https://radiopaedia.org/. 2021. • Taylor HS, Pal L, Sell E. <i>Speroff's Clinical Gynecologic Endocrinology and Infertility</i>. Philadelphia, PA: Wolters Kluwer; 2019. ISBN:978-1451189766.

Medical Knowledge 2: Genetic Principles of Parent Overall Intent: To demonstrate knowledge of sporadic and inherited genetic disease as it pertains to reproductive medicine	
Milestones	Examples
Level 1 <i>Demonstrates knowledge of basic genetic principles, recognizes heritable disorders associated with specific patient populations, and takes a basic genetic family history</i> <i>Demonstrates knowledge of basic genetic screening and diagnostic tests (genotyping versus sequencing)</i>	• Demonstrates knowledge of genetic history, as applied to reproductive disorders, such as hemoglobinopathies in people of Asian and African descent; Gaucher and Tay Sachs in people of Eastern European/Jewish descent; cystic fibrosis in patients of Caucasian descent, etc. • Understands that genotyping only examines the most common alleles while sequencing reads the entire gene end to end and can pick up rarer mutations
Level 2 <i>Applies knowledge of basic genetics to patient counseling (e.g., meiotic and mitotic errors, FMR1, Turner syndrome, advanced maternal age)</i> <i>Selects appropriate genetic testing for patients with reproductive disorders, infertility, and pregnancy loss</i>	• Demonstrates understanding of pedigree analysis for Mendelian and complex disorders • Discusses the meaning of various FMR1 Repeats 45-54 (grey zone), 54-200 (premutation) as well as sequelae of premutation to include primary ovarian insufficiency and Fragile X-associated tremor/ataxia syndrome (FXTAS) • Only orders evidence-based testing
Level 3 <i>Applies knowledge of reproductive genetic principles to provide counselling, optimize patient outcomes, and recognize non-reproductive manifestations of genetic and epigenetic syndromes (e.g., common gynecologic cancer syndromes, Triploidy, inversions, balanced translocations autosomal versus Robertsonian and uniparental disomy [UPD])</i> <i>Demonstrates knowledge of advanced genetic testing, including preimplantation genetic testing and diagnosis and appropriate use (e.g., whole exome sequencing [WES], whole genome</i>	• Recognizes common gynecologic cancer syndromes in patients' family history, including hereditary breast and ovarian cancer syndrome, Lynch syndrome, Li-Fraumeni syndrome, Cowden syndrome, Peutz-Jeghers syndrome, and hereditary diffuse gastric cancer, and refers the patient appropriately • Demonstrates knowledge of advanced genetic principles and uncommon hereditary syndromes (e.g., Kallmann syndrome, McCune-Albright syndrome) • Understands that whole exome studies only evaluates exons while whole genome studies sequences introns • Sequences panel when partner or patient screens positive for genetic mutation (i.e., doesn't use another screening test)

<i>sequencing [WGS], sequencing panels, microarray, karyotype)</i>	
Level 4 <i>Applies knowledge of advanced reproductive genetics to interpret and provide comprehensive counselling and treatment planning to optimize outcomes for patients, partners, and families (including basic risk counseling)</i> <i>Demonstrates knowledge of technology and techniques for advanced genetic testing of genomic samples from the parent or products of conception</i>	• Counsels patient about spinal muscular atrophy (SMA) and different types and how child with spinal muscular atrophy might look (e.g., (type of spinal muscular atrophy 0-4), SMN1 versus SMN2 if have extra SMN2 will have a milder phenotype) • Interprets pedigree data for patients with inherited and sporadic genetic somatic, and epigenetic disorders affecting the male and female reproductive system • Calculates risk of having an affected child pre- and post-carrier screening based on ethnicity • Knows to refer for sequencing/whole exome sequencing, (e.g., when patient partner has an undiagnosed abnormal phenotype)
Level 5 <i>Develops and implements innovative concepts and theories regarding genetic principles and testing</i> <i>Develops and implements new genetic screening protocols</i>	• Investigates evidence-based techniques or testing within genetics to optimize patients outcomes • Identifies segmental disorders in non-allelic homologous recombination: identifies who should be screened and develops techniques to implement that information
Assessment Models or Tools	• Case-based discussion
Curriculum Mapping	•
Notes or Resources	• McKinlay Gardner RJ, Amor DJ. <i>Gardner and Sutherland's Chromosome Abnormalities and Genetic Counseling</i>. 5th edition. New York, NY: Oxford University Press; 2018. ISBN:978-0199329007. • Nussbaum R, McInnes RR, Willard HF. <i>Thompson & Thompson Genetics in Medicine</i>. 8th edition. Philadelphia, PA: Elsevier; 2015. ISBN:978-1437706963.

Medical Knowledge 3: Genetic Principles of Gametes/Embryos Overall Intent: To demonstrate knowledge of cellular level genetics as well as gamete/embryo genetic testing	
Milestones	Examples
Level 1 <i>Demonstrates knowledge of the normal processes of meiosis and mitosis</i> <i>Demonstrates basic knowledge of normal epigenetic changes</i>	• Discusses the phases and goals of meiosis I and meiosis II (recombination, genetic diversity, haploid number of chromosomes) • Discusses the phases of mitosis • Discusses how spindle assembly works • Understands the concept of deoxyribonucleic acid (DNA) methylation and alterations of histone proteins
Level 2 <i>Demonstrates knowledge of the pathophysiology of meiotic and mitotic errors that lead to abnormalities (e.g., non-dysjunction, premature separation of sister chromatids)</i> <i>Demonstrates knowledge of how mosaic and segmental errors may develop</i>	• Describes meiotic errors during crossover • Identifies chromosomal breaks induced by environmental factors (radiation, medications, viruses) • Understands what balanced translocation, insertions, deletions, duplications are • Discusses implications of varying number of polar bodies (one versus two polar bodies) • Understands mosaicism usually arrives from mitotic nondisjunction or anaphase lag
Level 3 <i>Demonstrates knowledge of the analytical techniques used to evaluate genetic samples, as well as their limitations</i> <i>Demonstrates knowledge of the process of embryo testing from biopsy to final results (e.g., preimplantation genetic testing for aneuploidy [PGT-A], preimplantation genetic testing for monogenic disorders [PGT-M], preimplantation genetic testing for structural chromosomal rearrangements [PGT-SR], and methylation studies)</i>	• Understands how sequencing depth and amplification coverage affects results, (e.g., when starting with a few cells, single-gene disorders may not be consistently identified) • Understands that low copy numbers (i.e., only a few cells with embryo biopsy) significantly diminish the resolution to detect single-gene mutations • Understands aneuploidy including amplification process (e.g., bridge amplification), Sanger sequencing, and bioinformatics (next-generation sequencing) • Understands monogenic disorders including linkage analysis and single nucleotide polymorphism arrays
Level 4 <i>Demonstrates knowledge of recurrence risks for various genetic abnormalities of the embryo and their impact on future clinical prognosis (e.g., recurrence risk for aneuploidy, mosaicism, segmental abnormalities, de novo mutations, tri codon expansion)</i>	• Counsels patients on the risks/benefits of transferring mosaic embryos • Explains to a patient with all aneuploid embryos the expected recurrence risk in the next IVF cycle with aneuploidy testing

Level 5 <i>Performs research on new techniques to diagnose genetic abnormalities or to define their role in understanding or treating clinical pathology</i>	• Researches pigenetic variation resulting in genetic diversity with resulting subtle or unrecognized phenotypic effects (DNA methylation, alterations in histone proteins)
Assessment Models or Tools	• Direct observation • Global assessment
Curriculum Mapping	•
Notes or Resources	• McKinlay Gardner RJ, Amor DJ. <i>Gardner and Sutherland's Chromosome Abnormalities and Genetic Counseling</i>. 5th ed. New York, NY: Oxford University Press; 2018. ISBN:978-0199329007. • Practice Committees of the American Society for Reporudctive Medicine, Society for Assisted Reporudctive Technology. The use of preimplantation genetic testing for aneuploidy (PGT-A): A committee opinion. <i>Fertil Steril</i>. 2018;109(3):429-436. https://www.fertstert.org/article/S0015-0282(18)30002-5/fulltext. 2021. • Taylor HS, Pal L, Sell E. <i>Speroff's Clinical Gynecologic Endocrinology and Infertility</i>. Philadelphia, PA: Wolters Kluwer; 2019. ISBN:978-1451189766.

Medical Knowledge 4: Reproductive Medicine and Neuroendocrinology Overall Intent: To understand endocrine homeostasis and conditions which disrupt normal function, their effects on fertility, and how to evaluate hormone function throughout the reproductive period	
Milestones	Examples
Level 1 <i>Describes the embryology and anatomical relationships and function of the hypothalamus, neurovascular bundles, and target cells of the anterior and posterior pituitary</i> <i>Demonstrates knowledge of basic testing used to assess reproductive axis</i>	• Describes the structure and functional anatomy of the hypothalamus, portal circulation, and the anterior/posterior pituitary • Identifies the origin of common endocrine hormones • Understands the common hormones associated with the hypothalamic-pituitary axis
Level 2 <i>Describes the normal and abnormal physiology of hypothalamic pituitary reproductive axis, including feedback mechanisms, and hormone and receptor function</i> <i>Interprets results of basic endocrine testing for evaluation of the hypothalamus, pituitary, thyroid, adrenal, and gonadal systems</i>	• Describes factors influencing hypothalamic hormone secretion and their impact on pituitary hormone secretion • Distinguishes between negative and positive feedback mechanisms of the hypothalamic-pituitary-adrenal axis • Discusses disorders of hypothalamic-pituitary axis on the endocrine organs and associated clinical syndromes, such as Cushing's syndrome, hyperprolactinemia, and various thyroid disorders • Knows basics of hormone testing including estradiol, follicle stimulating hormone, and testosterone testing
Level 3 <i>Demonstrates comprehensive knowledge of common conditions that impact endocrine homeostasis (e.g., polycystic ovary syndrome, puberty, adolescence, pregnancy, climacteric, thyroid disease) and develops a treatment plan as appropriate</i> <i>Demonstrates knowledge of advanced and dynamic testing used to assess reproductive axis (e.g., adrenocorticotropin hormone stimulation)</i>	• Interprets test for excess or deficiency of thyroid or adrenal function, prolactin excess, and ovarian reserve screening • Describes disorders caused by deficient or excessive endocrine hormones including those of the thyroid, adrenal, parathyroid, and anterior and posterior pituitary • Describes the impact of pregnancy on hormone homeostasis • Describes prolactin effects on reproductive function • Describes in detail the changes which occur across the reproductive lifespan from pubescence to the climacteric • Describes possible disorders associated with the changes throughout reproductive life including irregular and excess bleeding, hyperandrogenism, symptoms of estrogen deficiency (urogenital atrophy, hot flashes, mood swings, sleep disorders, etc.), and pathophysiological changes which accompany hypogonadism (heart disease, osteoporosis)

	• Describes appropriate treatment plans for each type of symptom and the related disorders which occur secondary to endocrine changes throughout reproductive life
Level 4 <i>Demonstrates comprehensive knowledge of complex conditions that impact endocrine homeostasis (e.g., congenital adrenal hyperplasia [CAH], panhypopituitary) and develops a treatment plan as appropriate</i> <i>Applies knowledge of endocrine testing to provide management options for complex endocrine disorders (e.g., Cushing syndrome)</i>	• Describes how to perform and interpret dynamic testing of pituitary hormones • Discusses impact of pregnancy on approaches to dynamic testing of pituitary hormones • Describes approaches to treatment of disorders of the endocrine systems and how such treatment is monitored • Puts together and leads a multispecialty conference to discuss complex cases involved in adult or pediatric endocrinology
Level 5 <i>Applies and disseminates innovative approaches to complex and atypical endocrine disorders and implements a treatment plan based on emerging evidence</i>	• Develops and implements treatment plans for complex or atypical endocrine disorders • Develops new treatment algorithms integrating new medication or approaches to diagnosis and treatment of endocrinopathies
Assessment Models or Tools	• Direct observation • Global assessment
Curriculum Mapping	•
Notes or Resources	• Melmed S, Koenig R, Rosen C, Auchus R, Goldfine A. <i>Williams Textbook of Endocrinology</i>. 14th ed. Philadelphia, PA: Elsevier; 2019. ISBN:978-0323555968. • Taylor HS, Pal L, Sell E. <i>Speroff's Clinical Gynecologic Endocrinology and Infertility</i>. Philadelphia, PA: Wolters Kluwer; 2019. ISBN:978-1451189766.

Medical Knowledge 5: Andrology and Embryology Overall Intent: To understand the complex laboratory system supporting ART treatments and incorporate this information into maximization of patient care outcomes	
Milestones	Examples
Level 1 <i>Discusses the basic physiology and pathophysiology of oocytes</i> <i>Discusses the basic components of a semen analysis</i> <i>Describes the basic process of in vitro fertilization</i>	• Knows the embryologic origins of testes and ovaries • Describes spermatogenesis and oogenesis • Describes disease processes including Turner and Klinefelter • Knows the World Health Organization diagnostic criteria including the definitions of oligospermia, azoospermia, teratospermia, etc. • Identifies the steps of suppression, stimulation, maturation, retrieval, fertilization, transfer, cryopreservation
Level 2 <i>Identifies the developmental stages and milestones of oocytes and embryos during in vitro culture</i> <i>Identifies the developmental stages of spermatogenesis</i> <i>Identifies lab (andrology and in vitro) procedures, protocols, and equipment used during all stages from retrieved oocytes to the hatched blastocyst stages of development</i>	• Identifies primordial germ cell, oogonia, oocyte (primary, secondary) • Identifies primordial germ cell, spermatogonia, spermatocyte (primary, secondary) • Discusses early embryonic development including 2PN stage, cleavage, morula, and blastocyst • Describes sperm prep via simple wash versus swim-up versus microfluidics, etc. • Discusses single versus double lumen aspiration, vacuum settings, ultrasound use, retrieval, fertilization (conventional versus intracytoplasmic sperm injection), culture media, incubation settings, assisted hatching, observational checkpoints (fertilization check, Day 3, Day 5, etc.)
Level 3 <i>Grades embryos (American Society for Reproductive Medicine (ASRM); Gardner) at the various stages of development (pronuclear through hatched blastocyst)</i> <i>Demonstrates knowledge of routine andrology procedures (e.g., preparation of specimens for IUI or ART, evaluation of azoospermic specimens, antibody testing)</i>	• Grades 2PN stage through syngamy; identifies cleavage fragmentation, blastomere distribution, presence of multinucleation, morular compaction, and blastocyst expansion, inner cell mass and segregation of trophectoderm morphologies • Describes sperm prep via simple wash versus swim-up versus density gradient versus microfluidics • Discusses dilutional preparation based on intra-uterine insemination versus in vitro fertilization versus intracytoplasmic sperm injection • Understands anti-sperm antibody etiologies and use of intracytoplasmic sperm injection • Discusses epididymal/testicular extraction techniques

<i>Demonstrates knowledge of principles of andrology and in vitro culture (e.g., media composition, buffers to assure pH stability, factors that influence the stability of specimen preparation, culture system, and cryobiology)</i>	• Discusses basics of embryo media and culture system
Level 4 <i>Identifies abnormalities encountered in vitro at all stages from retrieved oocytes to the hatched blastocyst stages of development</i> <i>Identifies abnormal findings encountered during andrology testing in all specimen types (ejaculates, epididymal or testicular aspirations)</i> <i>Demonstrates knowledge of quality assurance data to determine if lab preparation, procedure, and culture conditions are acceptable</i>	• Identifies germinal vesicle, immature oocyte, mature oocyte, degenerating oocyte • Identifies failed fertilization, abnormal fertilization, 3PN/4PN, cytoplasmic granularity, vacuolization, zona pellucida formation, compaction, mono-pronuclear derived blastocyst • Identifies motility stimulating agent use, hypoosmotic swelling test, hyaluronan binding assays, high-magnification morphology, DNA fragmentation testing • Aware of local automated or manual data endpoint reviews for constant quality assurance surveillance
Level 5 <i>Proficiently relates data on in vitro embryo development to clinical prognosis in current and future treatment cycles</i> <i>Proficiently relates data from andrology testing to clinical prognosis in current and future treatment cycles</i> <i>Demonstrates advanced knowledge of lab procedures, protocols, and equipment and identifies/troubleshoots problems that may arise in the laboratory</i>	• Demonstrates ability to identify trends in prognosis data and synthesize correlations with lab (andrology and embryology) quality control data • Designs, implements, and confirms maintenance of College of American Pathologists (CAP)/ASRM quality control minimums (daily temperature checks versus lot checks for culture media) • Modifies and trouble shoots laboratory systems (air filtration, gas supply/regulation, alarm system operations) to improve outcomes
Assessment Models or Tools	• Direct observation • Quality control portfolio review
Curriculum Mapping	•
Notes or Resources	• ASRM. Embryology Certificate Course. https://store.asrm.org/Meet/MeetingDetails/productId/212242?_ga=2.63507375.1023886226.1634831108-657739101.1634831108. Accessed 2021. • Embryogenesis. List of the Modules. https://embryology.ch/genericpages/moduleembryoen.html. Accessed 2021.

- Gardner DK, Balaban B. Assessment of human embryo development using morphological criteria in an era of time-lapse, algorithms and 'OMICS': Is looking good still important? *Molecular Human Reproduction*. 2016;22(10):704–718. <https://academic.oup.com/molehr/article/22/10/704/2355284>.
- Heitmann RJ, Hill MJ, Richter K, Decherney AH. The simplified SART embryo scoring system is highly correlated to implantation and live birth in single blastocyst transfers. *Journal of Assisted Reproduction and Genetics*. 2013;30(4):563-567. https://www.researchgate.net/publication/235740883_The_simplified_SART_embryo_scoring_system_is_highly_correlated_to_implantation_and_live_birth_in_single_blastocyst_transfers.
- Practice Committee of the ASRM, Practice Committee of the Society for Assisted Reproductive Technology. Revised guidelines for human embryology and andrology laboratories. *Fertil Steril*. 2008;90(3):S45-S59. https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/revised_guidelines_for_human_embryology_and_andrology_laboratories.pdf.
- Practice Committee of the ASRM, Practice Committee of the Society for Assisted Reproductive Technology, Practice Committee of the Society of Reproductive Biologists and Technologists. Recommended practices for the management of embryology, andrology, and endocrinology laboratories: A committee opinion. *Fertil Steril*. 2014;102(4):960-963. https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-members/rec_practices_for_the_management_of_embryology_andrology_and_endocrinology_labs.pdf.
- Practice Committee of the ASRM, Society for Male Reproduction and Urology. Evaluation of the azoospermic male: A committee opinion. *Fertil Steril*. 2018;109(5):P777-P782. [https://www.fertstert.org/article/S0015-0282\(18\)30069-4/fulltext](https://www.fertstert.org/article/S0015-0282(18)30069-4/fulltext).

Systems-Based Practice 1: Patient Safety and Quality Improvement Overall Intent: To engage in the analysis and management of patient safety events, including relevant communication with patients, families, and health care professionals; to demonstrate the skills necessary to participate in quality improvement	
Milestones	Examples
Level 1 <i>Demonstrates knowledge of common potential patient safety events</i> <i>Demonstrates awareness of institutionally based patient safety reporting tools</i> <i>Demonstrates knowledge of basic quality improvement methodologies and metrics</i>	• Lists patient misidentification or medication errors as common patient safety events • Describes how to report errors in your environment • Describes fishbone tool or Plan Do Study Act (PDSA) cycle
Level 2 <i>Identifies system factors that lead to patient safety events</i> <i>Reports patient safety events through institutional reporting systems (simulated or actual)</i> <i>Describes local quality improvement initiatives (e.g., in vitro fertilization [IVF] outcomes, smoking cessation)</i>	• Identifies that lack of hand sanitizer dispenser at each clinical exam room may lead to increased infection rates • Reports lack of hand sanitizer dispenser at each clinical exam room to the medical director • Summarizes protocols to decrease surgical site infections
Level 3 <i>Participates in analysis of patient safety events (simulated or actual)</i> <i>Participates in disclosure of patient safety events to patients and patient families (simulated or actual)</i> <i>Participates in local quality improvement initiatives</i>	• Preparing for morbidity and mortality presentations • Through simulation, communicates with patients/families about a surgical error • Participates in project identifying better throughput in labor and delivery or the office
Level 4 <i>Conducts analysis of patient safety events and offers error prevention strategies (simulated or actual)</i> <i>Mentors others in disclosure of patient safety events</i>	• Collaborates with a team to conduct the analysis of a surgical error and can effectively communicate with patients/families about those events • Participates in the completion of a QI project to improve early detection of ectopic pregnancy based on human chorionic gonadotropin (HCG) trends within the practice,

<i>Leads current local quality improvement initiatives and implements improvements through outcome analysis</i>	including assessing the problem, articulating a broad goal, developing a SMART (Specific, Measurable, Attainable, Relevant, Time-bound) objective plan, and monitoring progress and challenges
Level 5 <i>Designs and implements scalable process improvements to prevent patient safety events</i> <i>Designs and implements scalable process improvements for institutionally based (or beyond) patient safety event reporting tools</i> <i>Designs and implements scalable quality improvement initiatives, fosters protocol changes based on analysis and outcomes</i>	• Assumes a leadership role at the departmental or institutional level for patient safety • Leads a simulation for disclosing patient safety events • Initiates and completes a QI project to improve fertility education in collaboration with a community provider and shares results with stakeholders
Assessment Models or Tools	• Simulation assessment • Assessment of reflection • Direct observation • E-module multiple choice tests • Multisource feedback • Global evaluation
Curriculum Mapping	•
Notes or Resources	• Institute of Healthcare Improvement (IHI). http://www.ihl.org/Pages/default.aspx. Accessed 2021. • Skochelak SE, Hammoud MM, Lomis KD, et al. <i>AMA Education Consortium: Health Systems Science</i>. 2nd ed. Elsevier; 2021. ISBN:9780323694629.

Systems-Based Practice 2: System Navigation for Patient-Centered Care Overall Intent: To effectively navigate the health care system, including the interdisciplinary team and other care providers, to adapt care to a specific patient population to ensure high-quality patient outcomes	
Milestones	Examples
Level 1 <i>Demonstrates knowledge of care coordination</i> <i>Identifies key elements for safe and effective transitions of care and hand-offs</i> <i>Demonstrates knowledge of population and community health needs and disparities</i>	• For a patient with cancer identifies the oncologist, the radiation oncologist, surgical oncologist, and social workers as members of the oncofertility team • Lists the essential components of a standardized sign-out checklist and care transition and hand-offs • Identifies that perceptions about fertility varies based on ethnic background and resources may vary based on insurance coverage
Level 2 <i>Coordinates care of patients in routine clinical situations, effectively using the roles of interprofessional team members</i> <i>Performs safe and effective transitions of care/hand-offs in routine clinical situations</i> <i>Identifies specific population and community health needs and inequities for the local population</i>	• Coordinates care with the patient's nursing team at the time of discharge from the procedure • Routinely uses a standardized approach for reviewing cycling patients to ensure proper care is coordinated while fellow is off • Helps uninsured patients navigate the healthcare system to optimize access to fertility care
Level 3 <i>Coordinates care of patients in complex clinical situations, effectively using the roles of interprofessional team members</i> <i>Performs safe and effective transitions of care/hand-offs in complex clinical situations and with multiple levels of the care team</i> <i>Uses local resources effectively to meet the needs of the entire patient population and community</i>	• Works to coordinate care for a medically complex, post-surgical patient that will ensure follow-up to care after discharge from the hospital • Routinely uses a standardized approach when signing out a complex cycling patient or patient admitted for ovarian hyperstimulation syndrome • Refers patients to a pharmacy or pharmacy program which provides a sliding fee scale option and prints pharmacy coupons for patients in need
Level 4 <i>Identifies concerns with current systems and identifies opportunities for improvement with specific recommendations</i>	• Identifies limitations and difficulty with oncofertility patients in obtaining quick and efficient care, arranges for better communication and scheduling between oncology and reproductive medicine

<i>Role models and advocates for safe and effective transitions of care/hand-offs within and across health care delivery systems, including outpatient settings and at-risk populations</i> <i>Participates in changing and adapting practice to transform the health education, care, and outcomes of patients vulnerable to care inequities</i>	• Prior to going on vacation, proactively informs the multidisciplinary team about a detailed and specific plan of care for a complex patient • Works with other health care providers to develop an evening clinic for working patients
Level 5 <i>Analyzes the process of care coordination and leads in the design and implementation of improvements</i> <i>Improves quality of transitions of care within and across health care delivery systems to optimize patient outcomes</i> <i>Leads innovations and advocates for populations and communities with health care inequities</i>	• Directs a root cause analysis to improve outcomes • Leads development of telehealth diagnostic services for a clinic without access to tertiary resources • Advocates for national coverage for fertility services for under insured populations with recommendations implemented
Assessment Models or Tools	• Direct observation • Global assessment • Medical record (chart) audit • Multisource feedback • Objective structured clinical exam (OSCE) • Review of sign out tools
Curriculum Mapping	•
Notes or Resources	• Centers for Disease Control and Prevention (CDC). Population Health Training. https://www.cdc.gov/pophealthtraining/whatis.html. Accessed 2021. • Kaplan KJ. In pursuit of patient-centered care. <i>Tissue Pathology</i>. 2016. http://tissuepathology.com/2016/03/29/in-pursuit-of-patient-centered-care/#axzz5e7nSsAns. Accessed 2021. • Skochelak SE, Hammoud MM, Lomis KD, et al. <i>AMA Education Consortium: Health Systems Science</i>. 2nd ed. Elsevier; 2021. ISBN:9780323694629.

Systems-Based Practice 3: Physician Role in Health Care Systems	
Overall Intent: To understand the physician's role in the complex health care system and how to optimize the system to improve patient care and the health system's performance	
Milestones	Examples
Level 1 <i>Identifies key components of the complex health care system (e.g., hospital, finance, personnel, technology)</i>	• Understands the impact of health plan coverage on prescription drug costs for individual patients • Understands that patient notes must meet coding requirements • Works well with other health care professionals (nurses, embryologists, pharmacists, etc.)
Level 2 <i>Demonstrates understanding of the complex interactions within major parts of a health care system and their impact (individually and wholly) on patient care</i>	• Explains that improving patient satisfaction impacts patient adherence and payment to the health system • Takes into consideration patient's prescription drug coverage when choosing outpatient treatment regimens • Recognizes that appropriate documentation can influence the severity of illness determination upon discharge
Level 3 <i>Demonstrates understanding of the role individual care components (e.g., nursing, same-day surgery, emergency department) have on the broader health care system (e.g., length of stay, readmission rates, clinical efficiency)</i>	• Discusses risks and benefits of same-day discharge after minimally invasive surgery • Demonstrates a collaborative approach when providing seamless patient care • Identifies methods to optimize steps involved in patient care
Level 4 <i>Successfully manages multidisciplinary teams/plans to provide efficient and effective patient care</i>	• Works with a patient navigator for a patient with complex gynecologic problems
Level 5 <i>Identifies and leads systemic changes that enhance the efficiency and effectiveness of patient care</i>	• Leads community or professional organizations to advocate for awareness of infertility disorders • Leads local or state health initiatives
Assessment Models or Tools	• Direct observation • Medical record (chart) audit • Patient satisfaction data
Curriculum Mapping	•
Notes or Resources	• Agency for Healthcare Research and Quality (AHRQ). Major Physician Measurement Sets. https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/measurementsets.html. Accessed 2021.

- AHRQ. Measuring the Quality of Physician Care. <https://www.ahrq.gov/professionals/quality-patient-safety/talkingquality/create/physician/challenges.html>. Accessed 2021.
- American Board of Internal Medicine (ABIM). QI/PI Activities. <https://www.abim.org/maintenance-of-certification/earning-points/qi-pi-activities/>. Accessed 2021.
- The Commonwealth Fund. Health System Data Center. http://datacenter.commonwealthfund.org/?_ga=2.110888517.1505146611.1495417431-1811932185.1495417431#ind=1/sc=1. Accessed 2021.
- Dzau VJ, McClellan MB, McGinnis JM, et al. Vital directions for health and health care: Priorities from a National Academy of Medicine initiative. *JAMA*. 2017;317(14):1461-1470. <https://nam.edu/vital-directions-for-health-health-care-priorities-from-a-national-academy-of-medicine-initiative/>. Accessed 2021.
- The Kaiser Family Foundation: Topic: Health Reform. <https://www.kff.org/topic/health-reform/>. Accessed 2021.
- The National Infertility Association: Resolve. Infertility Treatment Grants and Scholarships. <https://resolve.org/what-are-my-options/making-infertility-affordable/infertility-treatment-grants-scholarships/>. Accessed 2021.

Systems-Based Practice 4: Regulatory Overall Intent: To understand one's own role in laboratory management and how to optimize systems to improve patient care and performance outcomes	
Milestones	Examples
Level 1 <i>Knows that embryology laboratories must be accredited and inspected</i> <i>Discusses the need for quality control and proficiency testing within embryology laboratories</i>	• Understands the role that accreditation bodies have in maintaining laboratory quality and consistency • Is aware of the multitude of agencies (required or voluntary) for accreditation and quality control: ○ Inspection agencies include CAP and The Joint Commission ○ Quality control agencies include SART, the CDC, and Federal Drug Administration ○ Safety agencies: Occupational Safety and Health Administration • Understands that embryologists perform incubator checks and documentation logs, as well as embryology demonstration of proficiency to advance in responsibility • Is aware of lab variables critical for success (temperature, light, pH, osmolarity, media constituents, air quality)
Level 2 <i>Identifies the differences between accreditation and regulatory compliance; discusses the process for achieving accreditation and maintaining regulatory compliance</i> <i>Interprets Society for Assisted Reproductive Technology (SART) data and outcomes and evaluates institution outcomes and identify areas for improvement</i>	• Aware of the process for achieving accreditation and maintaining regulatory compliance • Is aware of regulation compliance by law, including state versus federal regulations. CDC, CMS, and FDA • Identifies national in-vitro fertilization success rates, clinic rates, and nuances that can explain differences in outcomes
Level 3 <i>Demonstrates knowledge of the components of laboratory accreditation and regulatory compliance</i> <i>Demonstrates knowledge of the components of a laboratory quality management plan</i>	• Understands the role of the CAP laboratory accreditation, including key examples of assessment criteria • Understands the steps involved in a laboratory quality management plan • Understands cyclical accreditation process of: Self-study, External Assessment, Recommendations, Implementation • Discusses that a quality management plan includes policies, equipment validation, quality control, and personnel training
Level 4 <i>Understands the elements of an internal or external laboratory inspection</i>	• Defines the steps involved in embryology laboratory inspection

<i>Reviews the quality management plan to identify areas for improvement</i>	Assists in preparation for an inspection, identifies potential deficiencies in the quality management plan and suggests improvements
Level 5 <i>Formulates a response for laboratory inspection deficiencies</i> <i>Creates and follows a comprehensive quality management plan</i>	- Leads the effort to review and respond to any CAP deficiencies - Develops methods within the laboratory to avoid deficiencies in the future - Follows Good Laboratory Practice principles for safety, quality assurance, data protection, equipment and facilities management and outcome reporting
Assessment Models or Tools	- Direct observation - QI project portfolio - Patient outcomes data
Curriculum Mapping	
Notes or Resources	- ABB. Standards and policies. https://global.abb/group/en/about/integrity/standards/standards-and-policies. Accessed 2021. - ASRM. Embryology course. https://airlearning.asrm.org/course/view.php?id=444&pageid=2321. Accessed 2021. - CITI Program. Good Laboratory Practice (GLP). https://about.citiprogram.org/course/good-laboratory-practice/. Accessed 2021. - Racosky, C. "How to Evaluate the Quality of an Embryology Lab." Fertility Explained, interview by Eduardo Hariton. 2021. https://www.youtube.com/watch?reload=9&app=desktop&v=QIH7VkXoqEQ. Accessed 2021.

Practice-Based Learning and Improvement 1: Evidence-Based and Informed Practice Overall Intent: To incorporate evidence and patient values into clinical practice	
Milestones	Examples
Level 1 <i>Demonstrates how to access and use available evidence, and incorporate patient preferences and values to take care of a routine patient</i>	• Identifies evidence-based guidelines from governing bodies (e.g., ASRM) for common issues in reproductive medicine • Uses electronic resources to obtain information and counsel a patient on pre-conceptual care and immunizations • Discusses alternate options for lifestyle changes to improve health based on patient preferences
Level 2 <i>Articulates clinical questions and elicits patient preferences and values to guide evidence-based care, with guidance from other health care team members</i>	• Discusses treatment options reflecting patient's individual preferences and beliefs such as embryo storage and/or disposal, masturbation to produce a specimen, etc. • Cogently counsels patient on miscarriage and ectopic pregnancy management options • Discusses a cost-effective approach to stepwise fertility treatment based on patient's preferences and insurance/financial status
Level 3 <i>Locates and applies the best available evidence, integrated with patient preference, to the care of complex patients, with minimal guidance</i>	• Obtains, discusses, and applies evidence for the treatment of a patient with recurrent pregnancy loss and an autoimmune condition or an ectopic pregnancy and known renal disease • Searches and incorporates available evidence and patient's preferences to determine best treatment plan for a large intramural fibroid or asymptomatic endometrioma • Coordinates journal club to address emerging literature and evidence that may affect practice pattern • Synthesize conflicting literature to best suit patient's history and preferences
Level 4 <i>Critically appraises and applies evidence, even in the face of uncertainty and conflicting evidence to guide care tailored to the individual patient</i>	• Assesses risks and benefits for gestational carrier in a patient with recurrent implantation failure • Identifies non-hormonal options for management of vasomotor symptoms in a postmenopausal woman with estrogen sensitive breast cancer • Counsels patient about options revolving around non-euploid embryos
Level 5 <i>Mentors others to critically appraise and apply evidence for complex patients, and/or participates in the development of guidelines</i>	• Leads clinical teaching on application of best practices in managing entry of non-binary individuals into the health care system • As part of a team, develops a standard protocol for management of non-tubal ectopic pregnancies presenting to the emergency room • Serves as an editor for academic journals or routinely offering insightful comments • Contributor to developing ASRM bulletins or guidelines
Assessment Models or Tools	• Direct observation/clinical evaluations • Research portfolio

	• Presentation evaluation (rounds or patient care conferences) • Oral or written examinations • Journal club evaluation • Fertility and sterility mentored reviews • Fresno Test
Curriculum Mapping	•
Notes or Resources	• ASRM. AIRlearning Courses. https://store.asrm.org/Learn/My-Courses. Accessed 2021. • Committee on Patient Safety and Quality Improvement. Clinical guidelines and standardization of practice to improve outcomes: ACOG committee opinion, Number 792. <i>Obstet Gynecol</i>. 2019;134(4):e122-e125. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2019/10/clinical-guidelines-and-standardization-of-practice-to-improve-outcomes. • CREOG: Milestone Tools Task Force. Journal Club Assessment. https://www.acog.org/-/media/project/acog/acogorg/files/creog/milestones-journal-club-assessment.docx?la=en&hash=E2E284E59639C04EF8F526A0CB97A699. Accessed 2021. • Practice Committee of the American Society for Reproductive Medicine. Interpretation of clinical trials: A committee opinion. <i>Fertil Steril</i>. 2020;113(2):295-304. https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/practice-guidelines/for-non-members/interpretation_of_clinical_trial_results.pdf. • US National Library of Medicine. PubMed Online Training. https://www.nlm.nih.gov/bsd/disted/pubmedtutorial/cover.html. Accessed 2021.

Practice-Based Learning and Improvement 2: Reflective Practice and Commitment to Personal Growth Overall Intent: To seek clinical performance information with the intent to improve care; reflects on all domains of practice, personal interactions, and behaviors, and their impact on colleagues and patients (reflective mindfulness); develop clear objectives and goals for improvement in some form of a learning plan	
Milestones	Examples
Level 1 <i>Identifies gap(s) between expectations and actual performance</i> <i>Establishes goals for personal and professional development</i>	• Incorporates evaluations from nursing, patients, peers, and faculty members to identify opportunities for improvement • Sets a personal practice goal of documenting surgical outcomes • Establishes mentor(s) and sets meeting times • Creates goals for the academic year
Level 2 <i>Analyzes and reflects on the factors that contribute to gap(s) between expectations and actual performance</i> <i>Identifies opportunities for performance improvement; designs a learning plan</i>	• Tracks progress from intrauterine insemination and mock embryo transfer to live embryo transfer • Follows up on patients in which they contributed clinical decisions and modifies their decision-making process • Identifies time management skills as a contributing factor to performance, and makes a detailed plan for more timely completion of patient histories and intakes and completion of clinic notes • When prompted, develops individual education plan to improve personal evaluation of male factor infertility
Level 3 <i>Institutes behavioral change(s) to narrow the gap(s) between expectations and actual performance</i> <i>Integrates practice data and feedback with humility to implement a learning plan</i>	• Using evidence-based resources, creates a personal curriculum to improve evaluation of failed fertilization, evaluation of thin endometrial stripe • Develops system to address not following up on patient outcomes (e.g., institutes calendar reminder to review patients' pathology results one week following surgical procedures) • Seeks out patient and staff member feedback to improve communication skills • Effectively follows through on development professional development goals, steps enacted, and outcomes achieved
Level 4 <i>Continuously reflects on remaining gaps and institutes behavioral adjustments to narrow them</i>	• Solicits patient feedback on modified history-taking techniques and counseling methods • After patient encounter, debriefs with the attending and outside interdisciplinary providers (e.g., geneticists or andrologists) to optimize future collaboration in the care of the couple • Develops a system for ensuring completion of patient well-being interventions such as vaccinations (e.g., rubella), smoking cessation, etc.

<i>Uses performance data to measure the effectiveness of the learning plan and adapts when necessary</i>	• Takes concerns noted in quality assurance review of patients and enacts system-wide improvement
Level 5 <i>Mentors others on reflective practice</i>	• Develops and disseminates educational module for collaboration with outside multidisciplinary providers (e.g., geneticists or andrologists) • Assists and oversees junior fellows and residents in improving their communication with and management of difficult patients
<i>Mentors others in the design and implementation of learning plans</i>	• Mentors co-researchers through research conception, protocol development and Institutional Review Board (IRB) approval
Assessment Models or Tools	• Chart reviews • Clinical evaluations • Direct observation • Patient care ratings • Review of learning plan • Semi-annual evaluations • Learner evaluations • 360-degree evaluations
Curriculum Mapping	•
Notes or Resources	• Babenko O, Koppula S, Daniels L, Nadon L, Daniels V. Lifelong learning along the education and career continuum: Meta-analysis of studies in health professions. <i>J Adv Med Educ Prof.</i> 2017;5(4):157-163. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5611424/. Accessed 2021. Note: Includes meta-analysis of a validated questionnaire about physician lifelong learning. • Fondahn E, Burke AE, Padmore JS, Ollendorff AT. Assessing for practice-based learning and improvement: Distinguishing evidence-based practice from reflective learning. <i>J Grad Med Educ.</i> 2021;13(2 Suppl):86-90. https://meridian.allenpress.com/jgme/article/13/2s/86/464385/Assessing-for-Practice-Based-Learning-and. Accessed 2021. • Lockspeiser TM, Schmitter PA, Lane JL et al. Assessing residents' written learning goals and goal writing skill: Validity evidence for the learning goal scoring rubric. <i>Acad Med.</i> 2013 Oct;88(10):1558-63. https://journals.lww.com/academicmedicine/Fulltext/2013/10000/Assessing_Residents_Written_Learning_Goals_and.39.aspx. Accessed 2021. • Resources to improve reflection skills:

	○ OpenLearn. Session 2: Reflective thinking, reflective learning and academic writing. https://www.open.edu/openlearn/ocw/mod/oucontent/view.php?id=51386. 2021. ○ University of Cambridge. Study Skills: What is reflective practice? https://libguides.cam.ac.uk/reflectivepracticetoolkit/whatisreflectivepractice. 2021.
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Practice-Based Learning and Improvement 3: Scholarly Activity	
Overall Intent: To identify areas worthy of investigation, design and implement a plan for investigation, and disseminate the findings of scholarly work; to set the foundation for lifelong journey of scientific discovery	
Milestones	Examples
Level 1 <i>Identifies areas worthy of scholarly investigation and completes the institution's Institutional Review Board (IRB) training</i>	• Identifies areas of interest and begins to formulate a research question • Performs a literature search on area of interest
Level 2 <i>Designs an ethical hypothesis-driven or hypothesis-generating scholarly thesis, under the direction of a research mentor</i>	• With assistance of a mentor, outlines a hypothesis and a plan to test the hypothesis • Develops alternative hypotheses to test should initial efforts fail • Develops IRB protocol and completes edits for complete approval
Level 3 <i>Presents products of scholarly activity at local, regional, or national meetings, and/or submits an abstract to regional, state, or national meetings</i>	• Presents original research data to the division • Presents original research at the regional or national level • Submits a grant request to a government or recognized body (e.g., American Society for Reproductive Medicine)
Level 4 <i>Completes and defends a comprehensive written scholarly thesis that demonstrates an ethical, advanced research methodology, design, and analysis</i>	• Successfully defends thesis • Designs a novel research project and applies for grant funding • Receives an award or prize for a research paper or poster at regional or national meeting
Level 5 <i>Publishes independent research that generates new medical knowledge, educational programs, or process improvement</i>	• Mentors another resident/fellow through a research project • Publishes research in a core medical journal • Serves on a national committee geared towards research design or fellowship research education • Publishes research in a peer-reviewed journal as first author • Mentors another resident/fellow through completion of a research project • Provides substantive feedback and improvements to research manuscripts through service on an editorial board for a peer-reviewed journal
Assessment Models or Tools	• Assessment of quality of presentations and/or research • Assessment of quality of publications, protocols, and/or grants • Editorial reviews following journal submission • Direct observation • Portfolio/CV
Curriculum Mapping	•
Notes or Resources	• ABOG. ABOG Bulletin for Subspecialty Certification in Reproductive Endocrinology and Infertility. Appendix D: Thesis Requirements. https://www.abog.org/docs/default-

	source/bulletins/2022/rei-2022-bulletin-2.24.2022.pdf. Accessed 2022. Key text on page 8: Fellows must submit a thesis that is “the product of a significantly thoughtful and robust research effort and [it] will be reviewed by the subspecialty division for acceptability...The research must be of significant importance to the field of the subspecialty.” • ABOG. Thesis Guidelines. Subspecialty Thesis, Case List De-Identification, & Approved Abbreviations. https://www.abog.org/subspecialty-certification/thesis-guidelines. Accessed 2022. • Blome C, Sondermann H, Augustin M. Accepted standards on how to give a medical research presentation: A systematic review of expert opinion papers. <i>GMS Journal for Medical Education</i>. 2017;34(1):Doc11. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5327661/. • Schünemann HJ, Wiercioch W, Brozek J, et al. GRADE Evidence to Decision (EtD) frameworks for adoption, adaption, and de novo development of trustworthy recommendations: GRADE-ADOLOPMENT. <i>Journal of Clinical Epidemiology</i>. 2017;81:101-110. https://www.jclinepi.com/article/S0895-4356(16)30482-6/fulltext. • Yoon U. <i>The Practical Guide to Clinical Research and Publication</i>. San Diego, California: Academic Press; 2021. ISBN: 978012824517 • ACGME requirement IV.D.3 Fellow Scholarly Activity: Fellows must demonstrate the ability to: design and implement a prospective data base; conduct clinical reproductive endocrinology or infertility research; use statistical methods to properly evaluate results of published research studies; guide other learners or other personnel in laboratory or clinical research; and navigate the interface of basic science with clinical cancer care to facilitate translational research
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Professionalism 1: Professional Behavior and Ethical Principles Overall Intent: To recognize and address lapses in ethical and professional behavior, demonstrates ethical and professional behaviors, and use appropriate resources for managing ethical and professional dilemmas	
Milestones	Examples
Level 1 <i>Demonstrates insight into professional behavior in routine situations and takes responsibility for one's own professional behavior</i> <i>Demonstrates knowledge of ethical principles</i>	• Respectfully approaches a resident who is late for or does not complete clinical responsibilities and notifies appropriate supervisor when a resident is routinely late for clinical responsibilities • Articulates how the principle of "do no harm" applies to a patient who may not need a procedure even though the education opportunity exists
Level 2 <i>Identifies and describes potential triggers for professionalism lapses and how to appropriately report professionalism lapses</i> <i>Analyzes straightforward situations using ethical principles</i>	• Understands that being tired can cause a lapse in professionalism • Understands being late has adverse effect on patient care and on professional relationships • Identifies and applies ethical principles involved in informed consent when the patient is unclear of all the risks
Level 3 <i>Demonstrates professional behavior in complex or stressful situations</i> <i>Recognizes the need to seek help in managing and resolving complex ethical situations</i>	• Appropriately responds to a distraught family member, following a surgical complication • After noticing a colleague's inappropriate social media post, reviews policies related to posting of content and seeks guidance • Offers treatment options for a patient with a poor prognosis, free of bias, while recognizing own limitations, and acknowledges patient autonomy while using shared decision making
Level 4 <i>Anticipates situations that may trigger professionalism lapses and intervenes to prevent lapses in oneself and others</i> <i>Uses appropriate resources for managing and resolving ethical dilemmas and identifies system-level issues that induce or exacerbate ethical problems</i>	• Anticipates the perspectives of others in stressful situations • Models respect for patients and promotes the same from colleagues, when a patient has been waiting an excessively long time to be seen • Recognizes and uses ethics consults, literature, risk-management/legal counsel to resolve ethical dilemmas
Level 5 <i>Coaches others when their behavior fails to meet professional expectations</i>	• Coaches others when their behavior fails to meet professional expectations and creates a performance improvement plan to prevent recurrence

Addresses system-level factors that induce or exacerbate ethical problems or impede their resolution	Engages stakeholders to address excessive wait times in the clinic to decrease patient and provider frustrations that could lead to unprofessional behavior
Assessment Models or Tools	- Direct observation - Global evaluation - Multisource feedback - Oral or written self-reflection - Simulation
Curriculum Mapping	
Notes or Resources	- ABIM Foundation. American Board of Internal Medicine. Medical professionalism in the new millennium: A physician charter. <i>Annals of Internal Medicine</i>. 2002;136(3):243-246. https://annals.org/aim/fullarticle/474090/medical-professionalism-new-millennium-physician-charter. - American Medical Association. Code of Ethics. https://www.ama-assn.org/delivering-care/ama-code-medical-ethics. Accessed 2021. - ASRM. Ethics: https://www.asrm.org/news-and-publications/ethics-committee-documents/. Accessed 2021. - Bynny RL, Paauw DS, Papadakis MA, Pfeil S. <i>Medical Professionalism Best Practices: Professionalism in the Modern Era</i>. Aurora, CO: Alpha Omega Alpha Medical Society; 2017. <i>Medical Professionalism Best Practices: Professionalism in the Modern Era</i>. Aurora, CO: Alpha Omega Alpha Medical Society; 2017. http://alphaomegaalpha.org/pdfs/Monograph2018.pdf. - Domen RE, Johnson K, Conran RM, et al. Professionalism in pathology: A case-based approach as a potential education tool. <i>Arch Pathol Lab Med</i>. 2017;141:215-219. https://meridian.allenpress.com/aplm/article/141/2/215/132523/Professionalism-in-Pathology-A-Case-Based-Approach. - Levinson W, Ginsburg S, Hafferty FW, Lucey CR. <i>Understanding Medical Professionalism</i>. 1st ed. New York, NY: McGraw-Hill Education; 2014. ISBN:978-0071807432.

Professionalism 2: Accountability/Conscientiousness Overall Intent: To take responsibility for one's own actions and the impact on patients and other members of the health care team	
Milestones	Examples
Level 1 <i>Performs tasks and responsibilities in a timely manner with appropriate attention to detail in routine situations</i>	• Completes work hour logs and documentation of case logs without the need for reminders
Level 2 <i>Performs tasks and responsibilities in a timely manner with appropriate attention to detail in complex or stressful situations</i>	• Responds to last minute requests for operating room coverage • Completes all aspects of charting following a challenging surgical case with complications
Level 3 <i>Anticipates and proactively implements strategies for ensuring timely completion of complex tasks in the future</i>	• Notifies attending of multiple competing demands on call, appropriately triages tasks, and asks for assistance from other residents or faculty members as needed • In preparation for being out of the office, arranges coverage for assigned clinical tasks on patients and ensures appropriate continuity of care
Level 4 <i>Recognizes situations that may impact others' ability to complete tasks and assists them in implementing strategies for timely task completion</i>	• Takes responsibility for inadvertently omitting key patient information requiring follow-up during sign-out and professionally discusses with the patient, family members, and interprofessional team
Level 5 <i>Establishes systems for the patient care team, prioritization of tasks, and coaching of team members in task completion</i>	• Sets up a meeting with the nurse manager to streamline patient discharges and leads team to find solutions to the problem • Supervises and mentors more junior residents, assisting with prioritization of clinical tasks to achieve completion in safest, most efficient manner • Working with nursing managers to rectify systems-based issues
Assessment Models or Tools	• Compliance with deadlines and timelines • Direct observation • Global evaluations • Multisource feedback • Self-evaluations and reflective tools • Simulation
Curriculum Mapping	•
Notes or Resources	• ASRM. Fertility Rights and Responsibilities. https://www.reproductivefacts.org/news-and-publications/patient-fact-sheets-and-booklets/documents/fact-sheets-and-info-booklets/fertility-rights-and-responsibilities/. Accessed 2021. • Code of conduct from fellow/resident institutional manual

Professionalism 3: Self-Awareness and Help-Seeking Overall Intent: To identify, use, manage, improve, and seek help for personal and professional well-being for self and others	
Milestones	Examples
Level 1 <i>Recognizes the importance of personal and professional fulfillment</i> <i>Recognizes the importance of health and well-being</i>	• Acknowledges own response to patient's genetic diagnosis • Implements change based on feedback on missed emotional cues after disclosing an adverse clinical outcome • Plans out coverage for vacation days
Level 2 <i>Demonstrates self-awareness of personal and professional fulfillment</i> <i>Recognizes resources available for health and well-being</i>	• Independently identifies and communicates impact of a personal family tragedy • Recognizes a pattern of missing emotional cues when disclosing an adverse clinical outcome and asks for feedback • Participates in institutional well-being activities
Level 3 <i>Proposes and implement a plan to optimize personal and professional fulfillment</i> <i>Utilizes resources for improving health and well-being as needed</i>	• With a mentor, develops a reflective response to deal with personal impact of difficult patient encounters and disclosures • Integrates feedback from the multidisciplinary team to develop a plan for identifying and responding to emotional cues during the next disclosure of an adverse clinical outcome • Notifies supervisor of a team member's increased personal stress
Level 4 <i>Coaches other team members to optimize personal and professional fulfillment</i> <i>Promotes health and well-being resource use by team members as needed</i>	• Independently identifies ways to manage personal stress • Self-assesses and seeks additional feedback on skills responding to emotional cues when disclosing an adverse clinical outcome • Respectfully approaches and supports a team member following an adverse outcome
Level 5 <i>Implements system-based resources for optimizing personal and professional fulfillment</i>	• Assists in organizational efforts to address clinician well-being after patient diagnosis/prognosis/death • Works with multidisciplinary team to develop a feedback framework for learners around disclosing an adverse clinical outcome
Assessment Models or Tools	• Direct observation • Group interview or discussions for team activities • Individual interview • Institutional online training modules

	• Self-assessment and personal learning plan
Curriculum Mapping	•
Notes or Resources	• This subcompetency is not intended to evaluate a fellow's well-being. Rather, the intent is to ensure that each fellow has the fundamental knowledge of factors that impact well-being, the mechanism by which those factors impact well-being, and available resources and tools to improve well-being. • Local resources, including Employee Assistance • ACGME. Well-Being Tools and Resources. http://dl.acgme.org/pages/well-being-tools-resources. Accessed 2022. • Hicks PJ, Schumacher D, Guralnick S, Carraccio C, Burke AE. Domain of competence: personal and professional development. <i>Acad Pediatr</i>. 2014 Mar-Apr;14(2 Suppl):S80-97. https://www.academicpedsjnl.net/article/S1876-2859(13)00332-X/fulltext.

Interpersonal and Communication Skills 1: Patient- and Family-Centered Communication Overall Intent: To deliberately use language and behaviors to form constructive relationships with patients, to identify communication barriers including self-reflection on personal biases, and minimize them in the doctor-patient relationships; organize and lead communication around shared decision-making	
Milestones	Examples
Level 1 <i>Demonstrates respect and establishes rapport with the patient and patient's family (e.g., situational awareness of language, disability, health literacy level, cultural differences)</i> <i>Communicates with patients and their families in an understandable and respectful manner</i>	• Introduces self and faculty member and their roles within the health care team • Identifies need for trained interpreter with non-English-speaking patients • Uses age-appropriate language when discussing reproductive care
Level 2 <i>Establishes a therapeutic relationship in straightforward encounters</i> <i>Identifies barriers to effective communication (e.g., health literacy, cultural differences)</i>	• Avoids medical jargon and restates patient perspective when discussing reproductive care • Inquires whether patient needs instructions or supplementary materials written in a different language • Recognizes the differences in how patients absorb knowledge, e.g., using handouts with diagrams and pictures and electronic resources and videos to communicate information • Prioritizes and sets agenda at the beginning of the appointment for a new patient with complex medical and social factors that may influence reproductive care options • Uses accessible resources for multiple levels of health literacy
Level 3 <i>Establishes a therapeutic relationship in challenging encounters (e.g., shared decision making)</i> <i>When prompted, reflects on personal biases while attempting to minimize communication barriers</i>	• Acknowledges patient's request for diagnostic studies and/or treatment outside of those characterized under standards of care • Participates in a multidisciplinary meeting to determine a plan for reproductive treatment/preservation in a patient anticipating gonadotoxic therapies • In a discussion with the faculty member, acknowledges discomfort in caring for a patient who is morbidly obese, smoker, or noncompliant with recommended management of comorbid medical conditions and/or does not want to make lifestyle changes
Level 4 <i>Facilitates difficult discussions specific to patient and patient family conferences, (e.g., poor prognosis, pregnancy loss, therapeutic uncertainty)</i>	• Leads discussion with patient with premature ovarian insufficiency who desires conception with autologous oocytes to align with the patient's values, using patient and family input

<i>Independently recognizes personal biases while attempting to proactively minimize communication barriers</i>	• Reflects on personal bias of a patient's decision to terminate a pregnancy and solicits input from faculty about overcoming these biases
Level 5 Mentors others in situational awareness and critical self-reflection <i>Coaches others in the facilitation of crucial conversations</i>	• Leads a discussion group on personal experience of moral distress • Develops a curriculum on social justice which addresses unconscious bias • Serves on a hospital bioethics committee
Assessment Models or Tools	• Direct observation • Kalamazoo Essential Elements Communication Checklist (Adapted) • Self-assessment including self-reflection exercises • Skills needed to Set the state, Elicit information, Give information, Understand the patient, and End the encounter (SEGUE)
Curriculum Mapping	•
Notes or Resources	• Cheung L. Applying a reflexive framework to evaluate a communication skills curriculum. <i>Adv Med Educ Pract.</i> 2016;7:587-592. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5072516/. • Laidlaw A, Hart J. Communication skills: An essential component of medical curricula. Part I: Assessment of clinical communication: AMEE Guide No. 51. <i>Med Teach.</i> 2011;33(1):6-8. https://www.tandfonline.com/doi/abs/10.3109/0142159X.2011.531170?journalCode=imte20. • Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. <i>Acad Med.</i> 2001;76(4):390-393. https://journals.lww.com/academicmedicine/Fulltext/2001/04000/Essential_Elements_of_Communication_in_Medical.21.aspx. • Makoul G. The SEGUE Framework for teaching and assessing communication skills. <i>Patient Educ Couns.</i> 2001;45(1):23-34. https://www.sciencedirect.com/science/article/abs/pii/S0738399101001367?via%3Dihub. • Peterson EB, Calhoun AW, Rider EA. The reliability of a modified Kalamazoo Consensus Statement Checklist for assessing the communication skills of multidisciplinary clinicians in the simulated environment. <i>Patient Educ Couns.</i> 2014;96(3):411-418. https://www.sciencedirect.com/science/article/abs/pii/S0738399114002870?via%3Dihub. • Street RL Jr, De Haes HCJM. Designing a curriculum for communication skills training from a theory and evidence-based perspective. <i>Patient Education and Counseling.</i>

2013;93(1):27-33.

<https://www.sciencedirect.com/science/article/abs/pii/S0738399113002371?via%3Dihub>.

- Symons AB, Swanson A, McGuigan D, Orange S, Akl EA. A tool for self-assessment of communication skills and professionalism in residents. *BMC Med Educ*. 2009; 9:1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2631014/>.

Interpersonal and Communication Skills 2: Patient Counseling and Shared Decision Making Overall Intent: To explain treatments and alternatives to patients and help them choose treatment options that best aligns with their preferences as well as their unique cultural and personal beliefs	
Milestones	Examples
Level 1 <i>Answers questions about the treatment plan and seeks guidance when appropriate</i>	• Identifies the components of the informed consent, including the indication for the procedure, alternatives to management and risks/ benefits of management choices • Discusses post-operative pain management following laparoscopic surgery and expected healing process • Discusses patient recovery expectations for egg retrieval procedure and properly educates patient on ART medication instructions
Level 2 <i>Counsels the patient through the decision-making process, including answering questions, for simple clinical problems</i>	• Provides alternative treatment options when providing informed consent to someone planning bilateral salpingectomy for hydrosalpinx for the optimization of subsequent fertility treatment outcomes
Level 3 <i>Counsels the patient through the decision-making process, including answering questions, for complex clinical problems</i>	• For a patient with obesity with multiple large uterine fibroids, discusses surgical approaches (laparoscopic, laparotomy), risks and benefits to each, and helps determine the safest surgical approach • Counsels nulliparous patient with an incidental uterine septum on pros and cons of septum resection
Level 4 <i>Counsels the patient through the decision-making process, including answering questions, for uncommon clinical problems</i>	• Appropriately determines that a patient previously consented for a procedure requires psychiatry evaluation for capacity due to behavioral instability
Level 5 <i>Develops resources for patient counseling and shared decision making</i>	• Develops curriculum addressing shared decision making in complex clinical situations related to fertility • Develops patient education materials distributed on a system wide and/or national level related to shared decision making in fertility/infertility
Assessment Models or Tools	• Chart-stimulated recall • Direct observation • Global assessment • Medical record (chart) audit • Multisource feedback • Simulation
Curriculum Mapping	•
Notes or Resources	• Elwyn G, Frosch D, Thomson R, et al. Shared decision making: A model for clinical practice. <i>J Gen Intern Med.</i> 2012;27(10):1361-1367. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3445676/.

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| | <ul style="list-style-type: none">• Elwyn G, Lloyd A, May C, et al. Collaborative deliberation: A model for patient care. <i>Patient Educ Couns</i>. 2014;97(2):158-64.
https://www.sciencedirect.com/science/article/abs/pii/S0738399114003012?via%3Dihub.• Joseph-Williams N, Williams D, Wood F, et al. A descriptive model of shared decision making derived from routine implementation in clinical practice ('Implement-SDM'): Qualitative study. <i>Patient Educ Couns</i>. 2019;102(10):1774-1785.
https://www.sciencedirect.com/science/article/abs/pii/S0738399119303015?via%3Dihub.• Stacey D, Légaré F, Lewis K, et al. Decision aids for people facing health treatment or screening decisions. <i>Cochrane Database Syst Rev</i>. 2017;4(4):CD001431.
https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD001431.pub5/full. |
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Interpersonal and Communication Skills 3: Interprofessional and Team Communication Overall Intent: To effectively communicate with the health care team, including consultants, in both straightforward and complex situations	
Milestones	Examples
Level 1 <i>Understands and respects the role and function of interprofessional/intradisciplinary team members</i>	• Receives consult request for a patient with inappropriate HCG rise, asks clarifying questions politely, and expresses gratitude for the consult • Acknowledges the contribution of each member of the health care team to the patient
Level 2 <i>Solicits insights from and uses language that values all interprofessional/intradisciplinary team members</i>	• Sends a message in the electronic health record to the registered dietician to inquire about the appropriate calorie content in a patient with diabetes and PCOS
Level 3 <i>Integrates contributions from interprofessional/intradisciplinary team members into the care plan</i>	• Uses recommendations of care team for pain control for discharge planning • Uses closed-loop communication with team members after interdisciplinary morning rounds to develop and enact a treatment plan
Level 4 <i>Prevents and mediates conflict and distress among the interprofessional/intradisciplinary team members</i>	• Demonstrates active listening by asking team members about their concerns and questions during patient rounds
Level 5 <i>Fosters a culture of open communication and effective teamwork within the interprofessional/intradisciplinary team</i>	• Mediates a conflict resolution between different members of the health care team, solicits other team member's opinions when making clinical decisions
Assessment Models or Tools	• Direct observation • Global assessment • Medical record (chart) audit • Multisource feedback • Simulation
Curriculum Mapping	•
Notes or Resources	• Boissy A, Windover AK, Bokar D, et al. Communication skills training for physicians improves patient satisfaction. <i>J Gen Intern Med</i>. 2016;31,755–761. https://link.springer.com/article/10.1007/s11606-016-3597-2. • Dehon E, Simpson K, Fowler D, Jones A. Development of the faculty 360. <i>MedEdPORTAL</i>. 2015;11:10174. https://www.mededportal.org/doi/10.15766/mep_2374-8265.10174. • Fay D, Mazzone M, Douglas L, Ambuel B. A validated, behavior-based evaluation instrument for family medicine residents. <i>MedEdPORTAL</i>. 2007;3:622. https://www.mededportal.org/doi/10.15766/mep_2374-8265.622.

- François, J. Tool to assess the quality of consultation and referral request letters in family medicine. *Can Fam Physician*. 2011;57(5):574–575.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093595/>.
- Green M, Parrott T, Cook G. Improving your communication skills. *BMJ*. 2012;344:e357
<https://www.bmj.com/content/344/bmj.e357>.
- Henry SG, Holmboe ES, Frankel RM. Evidence-based competencies for improving communication skills in graduate medical education: A review with suggestions for implementation. *Med Teach*. 2013;35(5):395-403.
<https://www.tandfonline.com/doi/abs/10.3109/0142159X.2013.769677?journalCode=imte20>.
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<https://pubmed.ncbi.nlm.nih.gov/10742358/>.
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- Roth CG, Eldin KW, Padmanabhan V, Freidman EM. Twelve tips for the introduction of emotional intelligence in medical education. *Med Teach*. 2018;21:1-4.
<https://www.tandfonline.com/doi/abs/10.1080/0142159X.2018.1481499?journalCode=imte20>.

Interpersonal and Communication Skills 4: Communication within Health Care Systems Overall Intent: To effectively communicate using a variety of methods	
Milestones	Examples
Level 1 <i>Accurately records information in the patient record</i> <i>Safeguards patient personal health information</i>	• Fills in all elements of a documentation template with the most up-to-date information available • Shreds patient list after rounds; avoids talking about patients in the elevator • Signs out of computer after patient encounter
Level 2 <i>Demonstrates organized diagnostic and therapeutic reasoning through notes in the patient record</i> <i>Documents required data in formats specified by institutional policy and suitable for interpretation by other clinicians and patients</i>	• Organized and accurate documentation outlines clinical reasoning that supports the treatment plan • Creates accurate, original notes that do not contain extraneous information such as verbatim transcriptions of radiology reports, and concisely summarizes the assessment and plan • Develops personalized templates for miscarriage management notes • Uses department smart-phrases and clinical smart sets for orders/documentation
Level 3 <i>Concisely reports diagnostic and therapeutic reasoning in the patient record in an efficient manner</i> <i>Appropriately selects direct (e.g., telephone, telemedicine, patient portal, in-person) and indirect (e.g., progress notes, text messages) forms of communication based on context</i>	• Documents complex clinical thinking concisely but may not include anticipatory guidance • Calls patient or sends electronic request to have nursing staff contact patient immediately about potentially critical test results
Level 4 <i>Communicates clearly, concisely, and in an organized written form and timely manner, including anticipatory guidance</i> <i>Produces written or verbal communication (patient notes, email, etc.) that serves as an example for others to follow</i>	• Creates consistently accurate, organized, and concise documentation, and frequently incorporates anticipatory guidance • Creates exemplary notes that are used as an example when teaching learners
Level 5 <i>Models feedback to improve others' written communication</i>	• Mentors/coaches colleagues how to improve clinical notes, including terminology, billing compliance, conciseness, and inclusion of all required elements

Guides departmental or institutional communication around policies and procedures	• Creates a policy around Health Insurance Portability and Accountability Act (HIPAA) compliant electronic communication (e.g., texting)
Assessment Models or Tools	• Direct observation • Medical record (chart) audit • Multisource feedback
Curriculum Mapping	•
Notes or Resources	• Bierman JA, Hufmeyer KK, Liss DT, Weaver AC, Heiman HL. Promoting responsible electronic documentation: Validity evidence for a checklist to assess progress notes in the electronic health record. <i>Teach Learn Med.</i> 2017;29(4):420-432. https://www.tandfonline.com/doi/full/10.1080/10401334.2017.1303385. • Haig KM, Sutton S, Whittington J. SBAR: A shared mental model for improving communication between clinicians. <i>Jt Comm J Qual Patient Saf.</i> 2006;32(3):167-175. https://www.jointcommissionjournal.com/article/S1553-7250(06)32022-3/fulltext. • Starmer AJ, Spector ND, Srivastava R, et al. I-pass, a mnemonic to standardize verbal handoffs. <i>Pediatrics.</i> 2012;129.2:201-204. https://pediatrics.aappublications.org/content/129/2/201.long?sso=1&sso_redirect_count=1&nftstatus=401&nftoken=00000000-0000-0000-0000-000000000000&nftstatusdescription=ERROR%3a+No+local+token.

To help programs transition to the new version of the Milestones, the ACGME has mapped the original Milestones 1.0 to the new Milestones 2.0. Indicated below are where the subcompetencies are similar between versions. These are not exact matches but are areas that include similar elements. Not all subcompetencies map between versions. Inclusion or exclusion of any subcompetency does not change the educational value or impact on curriculum or assessment.

Milestones 1.0	Milestones 2.0
PC1: General Infertility Evaluation	PC1: General Infertility and Evaluation
PC2: Ovulation Induction and Assisted Reproductive Technologies	PC2: Ovulation Induction and Assisted Reproductive Technologies
PC3: Surgery for Reproductive Disorders	PC3: Surgery for Reproductive Disorders
MK1: Diagnostic Techniques and Treatment Planning for Reproductive Disorders	MK1: Diagnostic Techniques and Treatment Planning for Reproductive Disorders
MK2: Genetic Principles	MK2: Genetic Principles MK3: Genetic Principles of Gametes/Embryos
MK3: Reproductive Medicine and Neuroendocrinology	MK4: Reproductive Medicine and Neuroendocrinology
No match	MK5: Andrology and Embryology
SBP1: Computer Systems	ICS4: Communication within Health Care Systems
SBP2: Value-based Patient Care (Quality/Cost)	SBP3: Physician Role in Health Care Systems
No match	SBP4: Regulatory
PBLI1: Scholarly Activity	No match
PBLI2: Quality Improvement (QI)	SBP1: Patient Safety and Quality Improvement
PBLI3: Education of Team Members	No match
No match	PBLI1: Evidence-Based and Informed Practice PBLI2: Reflective Practice and Commitment to Personal Growth
PROF1: Professional Ethics and Accountability	PROF1: Professional Behavior and Ethical Principles PROF2: Accountability/ Conscientiousness
PROF2: Compassion, Integrity, and Respect for Others	PROF1: Professional Behavior PROF2: Ethical Principles
No match	PROF3: Self-Awareness and Help-Seeking
ICS1: Teamwork and Communication with Physicians and Other Health Professionals	SBP2: System Navigation for Patient-Centered Care ICS3: Interprofessional and Team Communication
ICS2: Communication with Patients and Partner	ICS1: Patient and Family-Centered Communication ICS2: Patient Counseling and Shared Decision Making

Available Milestones Resources

Milestones 2.0: Assessment, Implementation, and Clinical Competency Committees Supplement, 2021 - <https://meridian.allenpress.com/jgme/issue/13/2s>

Milestones Guidebooks: <https://www.acgme.org/milestones/resources/>

- *Assessment Guidebook*
- *Clinical Competency Committee Guidebook*
- *Clinical Competency Committee Guidebook Executive Summaries*
- *Implementation Guidebook*
- *Milestones Guidebook*

Milestones Guidebook for Residents and Fellows: <https://www.acgme.org/residents-and-fellows/the-acgme-for-residents-and-fellows/>

- *Milestones Guidebook for Residents and Fellows*
- *Milestones Guidebook for Residents and Fellows Presentation*
- *Milestones 2.0 Guide Sheet for Residents and Fellows*

Milestones Research and Reports: <https://www.acgme.org/milestones/research/>

- *Milestones National Report*, updated each fall
- *Milestones Predictive Probability Report*, updated each fall
- *Milestones Bibliography*, updated twice each year

Developing Faculty Competencies in Assessment courses - <https://www.acgme.org/meetings-and-educational-activities/courses-and-workshops/developing-faculty-competencies-in-assessment/>

Assessment Tool: Direct Observation of Clinical Care (DOCC) - <https://dl.acgme.org/pages/assessment>

Assessment Tool: Teamwork Effectiveness Assessment Module (TEAM) - <https://team.acgme.org/>

Improving Assessment Using Direct Observation Toolkit - <https://dl.acgme.org/pages/acgme-faculty-development-toolkit-improving-assessment-using-direct-observation>

Remediation Toolkit - <https://dl.acgme.org/courses/acgme-remediation-toolkit>

Learn at ACGME has several courses on Assessment and Milestones - <https://dl.acgme.org/>