

2022 Gap Analysis and Educational Needs (Annual Meeting 2021)

Developed by the ASRM Continuing Medical Education Committee

TOPIC	GAP(S) IDENTIFIED	EDUCATIONAL NEED(S)	
Access to care	Technology & patient communication/updates.	What is the best way to get embryo information to the patients? The new generation of patient prefers emails/texts/portals vs. phone calls.	
Andrology / Male Infertility	Sperm testing methods beyond the semen analysis and their appropriate applications; Improvement in identifying optimal sperm for ICSI	Clinical studies to demonstrate evidence-based cost-effective techniques to improve fertilization in male infertility; Scientific criteria for application of ICSI	
	Advances in sperm testing.	Review of evidence on clinically used and novel tests to evaluate sperm quality including DNA fragmentation and genetic evaluation.	
	Male infertility interventions.	Evidence based education on the outcomes of the different male infertility interventions.	
	Testicular biopsy practices - clinical	Identification of REI and urology best practice integration, TESE outcomes and techniques, and frozen vs. fresh transfers.	
	Testicular biopsy practices - laboratory	Identification of laboratory best practice to generate the best outcomes. Various techniques in handling tissues from PESA, TESE, etc. Cryostorage of testicular tissues.	
	Is there anything we could do to optimize sperm preps than current protocols?	Does centrifugation of sperm prove to be detrimental to embryo development? Re-visit swim-up and other "new" sperm separation methods?	
	New technology in sperm selection.	New technologies in microfluidics, imaging, and other approaches to select top quality sperm for IVF and ICSI.	
	Diagnosis and treatment of male infertility	Diagnosis and treatment of male infertility issues early in ART can optimize outcomes; testing and selection of the best sperm for ART; being able to select sperm by gender	
	ART	Issues associated with in vitro gametogenesis	Future uses and implications of in vitro gametogenesis
		Freeze-all embryos	Continue training for small labs and out-of-date practices regarding FET and freeze-all embryos
Artificial Intelligence in the future for IVF		Education on Artificial Intelligence in the future for IVF	
ART Laboratory	Understanding application of artificial intelligence (AI) in the ART laboratory including equipment and training needed	Clinical studies of outcomes using AI along with cost-benefit analysis	
	Consistency in the IVF lab.	Analyze the how and why of an embryology/andrology lab: protocols and policies, QA/QC, personnel, equipment, and justification for the above.	
	Common practices in high-performing IVF programs: the laboratory	Understand the concept of best practice. Assess and learn common practices utilized by high-performing IVF programs' laboratory operation.	
	Oocyte freezing and thawing techniques.	Review current protocols to determine best practice techniques of oocyte freezing and thawing to improve patient outcomes.	

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	Lack of or standardized proficiency in ICSI and embryo biopsy.	Hands on training to improve skills with ICSI and embryo biopsy.
	Factors associated with embryo selection.	Education session on current evidence of embryo selection issues and evidence-based algorithms on embryo selection to maximize patient outcomes.
	Lab design, technology adoption, and implementation.	Discuss laboratory technologies and revise current protocols to best fit various settings and needs in the design of a laboratory. Identify key criteria to assess potential lab purchases. Financial stewardship.
	Time-lapse imaging (TLI) and morphokinetics.	Debate on new technologies and upcoming new approaches to TLI.
	Extended embryo culture: practical and experimental.	Review on current Day 0-7 embryo culture methodology, experimental technologies in culturing embryos beyond Day 7, as well as technical and ethical concerns.
	Artificial embryo	Derivation from extended cultured embryonic and extraembryonic structures, as well as stem cells. Future utilization in translational research, testing platform, and therapeutic applications.
	Artificial gametes: female and male.	Derivation from embryonic and stem cell lineages. Current progress and future applications.
	In vitro maturation of gametes.	Oocyte, sperm, various protocols and applications, and feasibility for routine laboratory practice.
	Total solutions in laboratory environment control.	Air quality, toxicity detection, internal and external environment of the ART laboratory, and implementing new design/improvement for the laboratory.
	Humid versus dry incubators for embryo culture.	Discuss pros and cons of those two major incubator settings. How to optimize utilization of incubators in the ART laboratories.
	Embryo development and pH.	Education on what we should target and how do embryos respond to pH variations.
	Embryo quality assessment.	Evaluate the current status of embryos, other than morphology and PGT, what tools do we use and are they reliable. Discuss how to reduce the number of embryos cryopreserved and genetically tested.
	Laboratory risk and disaster management: natural and other disasters, e.g. war.	Review and determine best practices in laboratory safety, alarm and monitoring systems, contingency plans, and patient material rescue. Extreme scenario including war. New developments and liability concerns.
	Training, recruiting, development, and retention of new embryologists.	Analyze the current status of educating staff, paradigm shift, available educational tools, and new learning technologies and trends. We need a pipeline and plan to meet the rapidly increasing demand of embryologists.
	Recruiting and cultivating future leaders in the laboratory science	Develop strategies to increase pipeline of laboratory professionals, and to cultivate junior staff with leadership skills.
	Laboratory staff wellness, professional development, and staffing. Mental	Evaluation of job security, financial stability, mental health, employee-employer relationship, continuous development, and mentoring mechanism to meet high complexity of today's

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	wellness and staff morale are of paramount importance.	laboratory tasks. Guideline development to meet the needs.
	Embryo abandonment and disposition.	Guideline review and development to ensure best practices can be followed by labs to ensure proper disposition of embryos.
	Changing landscape of laboratory practice.	Evolving laboratory practice in corporate/franchised vs. traditional settings.
	Communication between clinicians and the laboratory personnel.	Discuss clinical regimens and laboratory strategies on treating various types of patients.
	Laboratory quality management.	Discuss concept of QC/QA, KPI, staff evaluation, and how to implement these into the lab in a practical way.
	Best practice in utilizing laboratory quality improving tools.	Tools for tracking and improving performance, including key performance indicators (KPIs), checklists, root cause analysis, etc.
	Timing and operational optimization in embryo culture.	For labs without a time-lapse imaging system, should we keep 1 PNs in culture? Only for biopsy patients? How strict are labs with timing and what stays in culture? Is there an opportunity to streamline this?
	Identifying and triaging “fad” technologies and approaches.	It seems every day someone is introducing a technology that is either untested or proves to offer no real-world benefit after clinical trials, yet many labs cling to it as an add-on or marketing gimmick. More scientific and evidence-based education is needed.
	Improved biopsy techniques Optimizing vitrification.	Continue to review these topics within the context of IVF lab techniques
	Laboratory continuing education	Provide the opportunity for all Andrologists and Embryologists to attend education in the field of cryopreservation of eggs, embryos and sperm on a yearly basis.
Biology of Reproduction	Aa in 2021, role on environment on reproduction; tissue engineering and modeling in reproduction	Continued updates on outcomes related to ART and environment; Review and update research of engineering and modeling for use in reproduction.
	Endometrial receptivity, including the interaction between implantation and placentation.	Present the current state of knowledge on endometrial receptivity, how it affects pregnancy outcomes and ways to improve those outcomes.
	Emerging technology in embryo implantation and uterine receptivity.	Applicable and experimental methods in improving embryo implantation and embryo-uterine interaction. Using extended culture embryos and artificial embryos to study the window of implantation.
	Inner cell mass (ICM) and trophectoderm (TE).	Review the mechanisms of differentiated ICM and TE lineages, and to explore technologies to examine and potentially repair defects during embryo implantation and the earliest stage of pregnancy initiation.
	MicroRNA technology in ART	MicroRNA-based technology to be used in non-invasive assessment of embryo quality and endometrial receptivity

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	Improvement of implantation success	Latest data on molecular determinants of successful implantation in the human blastocyst and education on how to modify these determinants to improve implantation success
Contraception	New technology; Male contraception;	More insight into effective options in medically complicated patients
Counseling	As in 2021, mind-body techniques; improved empathy of team; including male support/counseling	As in 2021, establishing mind-body program; team training on empathy; specific counseling for PCOS, RPL, POI
COVID-19	Best practice in the post-COVID era.	How to safely operate the clinical practice and laboratory during and after COVID pandemic. Concerns and feasible approaches.
	Cross-border patient material transportation.	Handling and shipping patient materials among regions of different level of COVID transmission risk.
Early Human Development	Factors inherent to the fetus that impact recurrent pregnancy failure due to implantation.	Review current knowledge on early human development and its role in recurrent implantation failure.
Endometriosis	Management options for endometriosis in the setting of infertility	Day to day management. Discussion regarding medical/surgical treatment for infertility patients. Surgical management of endometriomas
	Limited ability of REs to perform ultrasounds for DIE; Lack of insurance coverage for work-up.	Increases surgical training for DIE; Clinical studies comparing medical treatments for DIE; best practices for IVF
Ethics/ Legal	Understand cultural differences in the acceptability of egg/embryo/sperm donation, GC. Address the need for an increase in egg donors of various racial/ethnic/multi-cultural backgrounds	Train healthcare professionals/team to understand multicultural attitudes toward third party reproduction; Clinical studies surveying patients on acceptance of egg donors of various multi-cultural backgrounds
	Lack of knowledge in the ever-changing legal climate as it relates to REI practice.	Review legal aspects of care including international families and cross-border reproductive care. Minimize/mitigate legal risk with regards to advanced technology.
	Communication with patients about ethical concerns of genetic alteration.	Discuss ethical issues and education of open communication with patients and administration to address concerns regarding genetic alteration specifically.
	Embryo disposition and donation.	Education for staff, administration, and patients for donation of embryos to research versus destroyed. Explain ways to cope with moral and psychological aspects of our jobs.
	Research programs liability.	Discuss the liability of research programs with focus on IVF programs.
	Ethical perspectives of patients from different cultures.	Examine and discuss the ethical perspectives of patients from different cultures in relationship to IVF.
	Gamete and embryo donation.	Analyze the implications of being a donor and a recipient. Describe how to maintain and preserve anonymity in an age of social media and technical piracy.
	Clinical embryology not recognized by CLIA	The possibility of clinical embryology being recognized as a separate profession and/or high complexity by federal and state regulations.
	Knowledge on how offspring feel about open vs. Closed gamete donation	Provide a session looking specifically at the perspective of the children who were conceived

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		from donor gametes and their questions and desires regarding biological parents
Fertility Preservation	Knowledge of fertility preservation surgical options	Review of benefits/risks of ovarian and testicular tissue cryopreservation, techniques for ovarian and testicular tissue cryopreservation and restoration procedures
	Ovarian tissue cryopreservation	Justice and ethical implications, counseling, cost-effectiveness, future implications for treatment of pre-pubertal pediatric heme/onc patients
	Elective and oncology preservation.	Evidence based protocol selection and outcomes for elective and oncology patients. Protocols for ovarian stimulation in the fertility preservation patient.
	Ovarian tissue preservation/uterine transplant.	Review the technical aspects of ovarian tissue preservation and uterine transplant.
	Sperm cryopreservation for male cancer patients.	Educate on the best methods of sperm retrieval in male cancer patients.
	International issues in fertility preservation including restrictions.	Knowledge and expertise on international issues in fertility preservations, including discussion of country-specific restrictions and resources to aid providers and patients in achieving desired care.
	Oocyte preservation skills and best practice.	Skill development forum on oocyte preservation skills and a review of guidelines and best practices.
Genetics/PGT	Lack of insurance coverage; Time constraints of team for communication and logistics of follow-up; Low vs. High mosaicism options for embryo transfer; cfDNA application	Close the gap between assessment of genetic counselor and REI; Increase training in understanding genetics; Improving precycle testing coordination & review; Clinical studies on refining percentage variations of reporting mosaicism
	Universally define a mosaic embryo – low/high grade; When is it appropriate to consider embryo transfer; Consistent reporting and labelling; Agreement of counseling between genetic counselors and healthcare providers.	Large clinical studies to provide safety and outcomes of transferring mosaic embryos; Train healthcare providers (MDs/lab/RNs) to accurately counsel patients. Define best practices.
	Genetic counseling.	Course taught by Genetic Counselor focused on genetics of different infertility diagnoses, interventions through ART, and relationship of genetic factors to outcomes.
	Lack of knowledge and best practice in utilizing non-invasive PGT. Non-invasive PGT (niPGT) benefits remains unclear.	Review of evidence on non-invasive genetic testing of embryos. Current progress, platforms, approaches (blastocoel sampling, spent medium,

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		etc.), utilization, and timeframe for routine use. Pros and cons of niPGT vs. traditional PGT
	Counseling to support patients with mosaicism embryos and sub chromosomal variations.	Discuss best practice on transfer or not to transfer mosaic embryos. Education on the techniques behind PGT and how mosaics are identified. Review the clinical implications of transferring mosaic embryos.
	Gene editing to improve outcomes.	Provide learning opportunities on all aspects of PGT, including techniques, and clinical use of results. Provide comprehensive education on current state of gene editing and associated issues.
	Genetic workup for patients.	Review of different genetic workups, practice patterns, and best practices. Develop protocols for patients that should or should not receive PGT-A testing.
	Genetic mechanism in male and female gametes contributing to embryo aneuploidy and mosaicism.	Summarize common genetic conditions that have reproductive consequences for patients.
	New technologies in PGT and moving forward.	Discuss history of PGT, review accuracy of platforms, discuss new generations of PGT method, and barriers of implementing those technologies.
	PGT-A abnormal and mosaic embryos: lack of guidelines for the embryologists.	Review origins, detection, and communication on PGT-A of aneuploidy and mosaic embryos. Discuss issues in handling, transferring, and discarding mosaic embryos. Consistency of data interpretation and reporting.
	PGT-A technology information.	Course for MDs, nurses, and laboratory personnel to understand the key differences among various PGT technologies, as well as other ART-related genetic testing. Limitations of various platforms/methodologies.
	Impact of epigenetics on ART outcomes.	Review research on effect on the embryo and long-term offspring health. Discuss future applications.
	Time-lapse imaging (TLI) for aneuploidy.	Review data on TLI for aneuploidy interpretation.
	Understanding the potential use and risk of transferring mosaic and aneuploidy embryos. Communication on PGT-A mosaic and aneuploid embryo outcomes within the care team and with the patients.	Best approaches to discuss with clinicians and patients on transferring mosaic and aneuploid embryos? Issues to consider before discarding those embryos? How does the program interpret the data and report it, and does that make a difference in how we feel about discarding an

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		embryo? How do we deal with this aspect of our jobs morally and psychologically?
	Good practice in embryo biopsy.	Guidelines in embryo biopsy and re-biopsy/vitrification for repeated PGT-A.
	Lack of knowledge in genetic stability regarding artificial embryos.	Genetic/epigenetic stability or instability in artificial embryos derived from embryonic structures or stem cells.
	Gene editing 101: what is available	Lecture on gene editing for clinicians, clinical laboratory, and other reproductive medicine professions.
	Should we continue to perform PGT-A in more patients?	Feasibility, benefits, and pitfalls of the increasing practice of PGT-A. Universal PGT-A vs. selective PGT-A.
	Inadequate understanding of PGT risks More information on non-invasive PGT Limited data presented re Mosaicism	Continue to offer education about PGT, expanding on areas of uncertainty as data emerge.
	Genetics	continued updates on genetics
Imaging	3D/4D sono training and application in reproductive medicine; new techniques for tubal assessment – Exem Foam; HyCoSy. Evaluate applicability and limitations of office-based hysteroscopy. Lack of understanding the optimal method of uterine cavity evaluation and frequency during ART cycles.	Hands-on training programs for reproductive providers in 3D/4D pelvic ultrasound, including its application with saline infusion sonogram. Clinical studies to clarify utility and cost effectiveness of alternative methods to assess tubal patency. Analysis of office-based hysteroscopy equipment, reimbursement, cost-effectiveness, and patient tolerance. Clinical study to evaluate the frequency of uterine cavity assessment during ART and its impact.
Infertility	Sexual dysfunction in individuals and couples with infertility	Identification, support and treatment of patients and couples with sexual dysfunction in the space of infertility
	Supporting patients who have negative outcomes in infertility treatment; how to approach and support the patient	How to help and support patients in the face of negative outcomes
Leiomyomas	Knowledge of uterine leiomyomas and minimally invasive treatment options	Current surgical and non-surgical management of uterine fibroids in patients who desire fertility (immediate and future). Tips/tricks to move from abdominal myomectomy to minimally invasive myomectomy
Menopause/ Ovarian Insufficiency	Lack of insurance coverage for evaluation; Dr. Google to Dr. REI	Clinical studies on the effectiveness of “batching” egg retrieval cycles; Clarity in the medical literature

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	Hormonal therapy in patients with POI	Hormonal therapy for patients with POI and data regarding its use
	menopausal management lectures	Continued education on Menopause management
Mental Health	Mental health care for patients with early pregnancy loss	Perspectives and support services for patients with early pregnancy loss in highly desired pregnancies
Practice/ Risk Management/ Team-based Care	Identifying appropriate team members for the multidisciplinary approach of Primary Ovarian Insufficiency (POI); Establishing a consensus on timing of and testing the patient with POI.	Workshop to establish roles of a team of healthcare providers in management of patients with POI. Clinical studies examining alternative management options including PRP. Identifying potential genetic of POI.
	Meeting accreditation and certification requirements: laboratory	Lectures and workshops focusing on a holistic strategy to meet requirements of CLIA, CAP, SART, etc, and manage inspections.
	Lack of knowledge and best practice in electronic health record (EHR) systems: laboratory	Available options and designs of EHR laboratory module. How to implement HER in the laboratory.
	Lack of knowledge in non-conformance prevention: clinical and laboratory.	Root cause of non-conformance. Methods to prevent errors (checklist, witness system, etc.)
	Error prevention in ART laboratory and fertility practice in general.	Not just ID errors, but all errors of omission and miscommunication.
Pregnancy/ Pregnancy Loss	Adenomyosis, microbiome, and immunology in RPL	Continue to provide education on RPL and address these topics based on available and emerging evidence
	Metabolic factor impact on RIF and recurrent abortion	Education on metabolic factor impact on RIF and recurrent abortion
	Science about newer endometrial markers	Continued education on immunology and signaling
	Similar course in the future, or data-based guidance of RPL treatments	Continued education on recurrent pregnancy loss
Reproductive Surgery	Office procedures for evaluation of infertile female	Outcomes, economic implications, patient satisfaction, equipment considerations in office hysteroscopy, sonohsg updates
	Minimally invasive reproductive surgery technique/skill set	Hands-on course for laparoscopy and hysteroscopy (especially office hysteroscopy)
	Whether cesarean section scar isthmoceles need to be treated	Surgical approaches to caesarean section scar separation (isthmocele) and when they are indicated
	Effect of adenomyosis on fertility	Overview of adenomyosis and its relationship to the biology of reproduction with a focus on current techniques for treatment (medical and surgical)
	Diagnosis and surgical management of Mullerian anomalies	Review of new ASRM classification system and the app. Preoperative preparation, imaging, and review of surgical treatment of uterine/vaginal anomalies

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	Tubal surgery to optimize fertility	Discussion on how to address hydrosalpinges, and role of fimbrioplasty. Tubal function, evaluation, and impact for fertility patients (especially those that cannot move forward with IVF)
	Modern reproductive surgery	Review of robotic surgery, novel minimally invasive techniques, ERAS protocols, pre-op, and post-op considerations
	Methods to optimize the difficult egg retrieval (abdominal) and embryo transfer	Surgical application of abdominal egg retrieval and guidelines for embryo transfer technique (embryo transfer simulator hands-on)
	C-Section scar defect repair	Latest trends and techniques for hysteroscopic and laparoscopic repair of C-section scar defects
Stem Cells	Therapeutic applications of stem cells in reproduction.	Review of current application of stem cell research as it applies to reproductive medicine and future application.
	Progress and outlook in utilizing artificial gametes and embryos.	Scientific studies on the current progress, limitations, ethical concerns, and potential timeline for utilization of artificial gametes and embryos.
	Stem cell research and gene editing.	Summarize research studies and issues associated with gene editing of stem cells.
	Stem cell 101.	Review of pathophysiology of stem cells, types of stem cell, and applications.
	New frontiers and next innovative disruption(s) in reproductive and regenerative technology.	Discuss potential future innovative disruption(s) in reproductive and regenerative technology and impact on IVF.
	Long-term preservation of stem cell for clinical use.	Evaluating the efficacy of stem cell cryopreservation and storage relative to solution and container types used.
	Application of synthetic biology in reproductive medicine.	Using synthetic biology to regenerate and repair embryo, tissues, and organs.
	Use of Stem cell derived gametes	The future of stem cell derived gametes and both technical aspects and ethical implications
Technology	Artificial intelligence (AI) in ART: basic concept of AI, current technology development, and utilization	Terminology of AI. Application of AI in embryo selection, non-invasive PGT, patient treatment and follow-up. Integration of technology and management tools to streamline and improve IVF.
	Future of IVF and personalization of the process.	Refining the ovarian stimulation protocols and transfer protocols to allow for more personalization.
	Automation and robotics in the laboratory.	Systems and applications for laboratory to improve workflow, management, and infertility treatment of patients.
	Technologies to improve gamete and embryo culture outcomes.	Utilize microfluidics and other technologies to fine tune gamete and embryo culture protocols, as well as in vitro maturation of gametes.
	Lack of knowledge in cybersecurity and safety of data storage.	Understand the voluntariness of clinical and laboratory data. Best practice in cybersecurity. Hardware and software configurations for on-site and cloud-based solutions.

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Journal Editors	Interpreting a medical article; Clinical study from idea to fruition; Statistics and bias.	Mentorship programs for clinical study design and manuscript submission; Increased training in statistics; Guidance on editorial writing and/or being an editor
Oncofertility	Childhood/adolescent options; Ovarian tissue cryo policies and procedures; Medical options to preserve fertility pre chemotherapy/radiation	Clinical studies on best practices for child/adolescent; ovarian tissue cryo and increased clarity on GnRH agonist/antagonists to preserve fertility
Adolescents/Pelvic pain	Comprehensive differential diagnosis of all etiologies for pelvic pain in adolescents. Benefit of counseling/support	Cost effective algorithm approach to diagnosis; Imaging/blood testing/treatment options. Clinical studies on reproductive and psychological impact
	Diversity, Equity & Inclusion	How to create a diverse and equitable environment for staff and patients
	Diversity in the field of REI	Diverse patients benefit from care given by diverse providers; how to recruit and provide a diverse care team
	Use of social media in practice	Benefits and risks of social media in medicine and for patient education