

**Mishaps: How and Why Mistakes Occur in the Assisted Reproductive
Technologies Laboratory, and How to Prevent Them**
(Mistakes that Affect the Number or Quality of Gametes or Embryos)

Andrew R. La Barbera, Ph.D., H.C.L.D.
Professor of Obstetrics and Gynecology
Professor of Molecular and Cellular Physiology
University of Cincinnati College of Medicine
and
Scientific Director
American Society for Reproductive Medicine

I. Oocyte Processing

Step	Mishap	Prevention
Oocytes given to embryologist	Misidentification of patient	Physician and embryologist confirm identity prior to oocyte collection Label all containers with patient identification information Two people confirm identification data
	Collection container or medium toxic to oocytes	Test and document the quality of containers and media
Grading of oocyte maturation and quality	Misclassification of oocyte development at time of collection	Train laboratory personnel
Pre-incubation of oocyte	Culture medium toxic to oocytes	Quality control culture media Document use of approved medium
	Abnormal incubator temperature	Perform regular equipment maintenance Document equipment performance
Oocyte handling	Oocytes exposed to harmful environment	Minimize time outside incubator Use controlled environment chamber Train laboratory personnel
	Mislabeled of oocytes	Write patient name on all containers Color code all containers Barcode identification of all containers with automatic warning
	Oocyte damage/destruction (spillage, dropping, incorrect medium, incorrect volume)	Use stable holders for containers Train and monitor laboratory personnel Establish written, standardized procedures

II. Sperm Processing

Step	Mishap	Prevention
Sperm collection	Misidentification of patient	Require on-site specimen collection Ask patient to state his name Record patient name in log book Label all containers with patient identification information Two people confirm identification data
	Collection container toxic to oocytes	Test and document quality of containers
Liquefaction of semen	Liquefaction time insufficient or excessive	Establish liquefaction time in protocol Record time specimen received Set timer
	Abnormal temperature	Require on-site collection under standardized conditions
Sperm processing	Sperm exposed to harmful environment	Use controlled environment chamber for interim storage of sperm
	Processing medium toxic to sperm	Quality control processing media Document use of approved medium
	Mislabeled sperm	Write patient name on all containers Color code all containers Barcode identification of all containers
	Destruction of sperm (spillage, dropping, incorrect medium, incorrect volume)	Use stable holders for containers Train and monitor laboratory personnel Establish written, standardized procedures

III. Insemination, Fertilization and Embryo Culture

Step	Mishap	Prevention
Insemination of female patient	Patient inseminated with incorrect sperm	Write female patient and male partner names and male partner's date of birth on insemination catheter and all specimen containers Physician ask female patient to state her name and that of her male partner
Insemination of oocytes	Mislabeled of oocytes	Record patient name on all vessels Color code all vessels Barcode identification of all vessels
	Oocytes inseminated with incorrect sperm	Physician and embryologist confirm identity prior to oocyte collection Label all tubes, dishes, etc., with female and male patient identification information Two people confirm identification data
	Culture medium toxic to oocytes	Test and document quality of medium
	Incorrect quantity of sperm	Perform and record multiple counts of motile sperm number prior to insemination
Culture of oocytes and sperm	Misclassification of oocyte development after preincubation	Document training of laboratory personnel Establish regular proficiency testing
	Culture medium or instruments toxic to oocytes and/or sperm	Perform quality control assays of all media, instruments and containers
	Abnormal incubator temperature or gas mixture	Perform regular equipment maintenance Regularly document equipment performance and maintenance
Fertilization check	Incorrect assessment of fertilization	Perform regular quality control/quality improvement assessments of lab personnel
Embryo culture	Gametes and/or embryos exposed to harmful environment	Minimize time outside incubator Use controlled environment chamber Perform quality control of all culture media Perform quality control of incubator gas mixture
	Destruction of oocytes (spillage, dropping, improper additives, incorrect volume)	Stabilize holders for all tubes, dishes, etc. Label all additives and instruments with expiration date and date of quality control assay Regularly test and document accuracy and precision of instruments

IV. Embryo Transfer

Step	Mishap	Prevention
Embryos selected for transfer	Incorrect assessment of embryo development	Regular proficiency training and assessment of laboratory personnel Document embryo development photographically Two people independently assess development
Embryos loaded into catheter	Catheter toxic to embryos	Perform quality control assessment of catheters Verify quality control analysis by manufacturer
	Loss of embryos	Train technical personnel in handling embryos and loading catheter Regularly assess technical proficiency
	Mislabeled of embryos	Compare patient identification data for culture vessel and transfer catheter
Embryo transfer	Embryo-patient mismatch: wrong embryos transferred to patient	Label transfer catheter with patient and male partner names Color code transfer catheter sheath Barcode transfer catheter sheath Physician and embryologist confirm patient identity prior to embryo transfer Maintain and document chain of custody
	Damage to embryos	Minimize time between removal from incubator and transfer into patient Maintain embryos at adequate temperature
	Embryos retained in catheter after transfer	Flush catheter with medium Check catheter microscopically

V. Cryopreservation, Storage and Use of Gametes and Embryos

<i>Step</i>	<i>Mishap</i>	<i>Prevention</i>
Cryopreservation	Cryopreservation damage	Strictly adhere to established protocols Maintain cryopreservation equipment Monitor cryopreservation process Record cryopreservation parameters Perform regular quality control cryopreservation
	Loss of gametes or embryos	Verify number and integrity prior to procedure
Storage	Viral cross contamination	Store contaminated specimens in separate containers or not at all
	Equipment failure	Maintain parallel backup systems Establish parameters of normal equipment performance Monitor equipment performance continuously Establish emergency procedures
	Loss of identification	Establish redundant identification procedures that withstand liquid nitrogen storage
Thawing	Loss of viability	Strictly adhere to established protocols Monitor viability Record performance parameters
	Loss of tissue	Compare the quantity of gametes or embryos at the beginning and end of the procedure
Use	Patient-tissue mismatch	Label containers, vessels and catheter with both patient and male partner names Color code transfer catheter sheath Barcode transfer catheter sheath Physician and embryologist confirm patient and partner identities prior to embryo transfer
	Loss of tissue	Maintain and document chain of custody