

# Performing the embryo transfer: a guideline

Practice Committee of the American Society for Reproductive Medicine

American Society for Reproductive Medicine, Birmingham, Alabama

A systematic review of the literature was conducted which examined each of the major steps of embryo transfer. Recommendations made for improving pregnancy rates are based on interventions demonstrated to be either beneficial or not beneficial. (*Fertil Steril*® 2017;107:882–96. ©2017 by American Society for Reproductive Medicine.)

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One of the most critical steps in the process of in vitro fertilization (IVF) is the embryo transfer. Studies have consistently demonstrated that embryo transfer pregnancy rates differ depending upon the clinician performing the procedure (1–3). In addition, data are accumulating that demonstrate a paucity of training in current fellowship programs or for practitioners who may have embryo transfer success rates consistently below the mean. A recent survey of Society for Assisted Reproductive Technology (SART) medical directors demonstrates that essentially all practitioners are allowed to perform embryo transfer if they desire, no matter what their skill (4). Half of the programs allow clinicians to perform embryo transfer using their personal “procedure” rather than having a standard protocol for all clinicians to follow. The results of that comprehensive survey demonstrate the breakdown of responses for 84 questions. From that survey, steps were identified for which the majority of practitioners demonstrated concordance, others were found to have nearly equal discordance, and, for most, a few outliers were identified. From those data a Common Practice Protocol was

developed (4). The purpose of this guideline for performing embryo transfer is to examine the various steps of the Common Practice Protocol by a systematic review of the literature to determine which of the steps, if any, are supported by sufficient data.

## METHODS

This clinical practice guideline was based on a systematic review of the literature. A systematic literature search of relevant articles was performed in the electronic database MEDLINE through PubMed in December 2016, with a filter for human subject research. No limit or filter was used for time period or English language, but articles were subsequently culled for English language. A combination of the following medical subject headings or text words/keywords were used: acupuncture; acupuncture therapy; afterloading; ambulation; analgesia; analgesic; analgesics; anesthesia; anti anxiety; antibacterial hand soaps; antibiotic; antibiotics; antibiotic prophylaxis; bed rest; bed rest; birth; bleeding; blastocyst transfer; blood; catheter; catheter remains; catheter remnants; catheterization;

catheterization/adverse effects; catheterization/methods; cervix; Chinese medicine; cleanse; cleanser; cleansing; deposition; disinfection; duration; ejection; embryo retention; embryo transfer; embryo transfer catheter; embryo transfer/instrumentation; embryo transfer/methods; embryo transfer protocol; embryo transfer techniques; endometrial; endometrial cavity; endometrium; expel; expulsion; flushing; gloves; hand disinfection; hand hygiene; hand washing; hand washing/behavior; hand washing/behaviors; hand disinfectant; hand disinfectants; hand washing/glove; implantation; injection; in vitro fertilization; IVF; load; loading; massage; medicine, Chinese traditional relaxant; mucus; mucous; physician; physician’s role; placement; plunge; plunger; pregnancy; pressure; recumbency; recumbent; recumbent position; recumbent posture; release; replacement; rest; retained embryos; sedation; simulation; skin scrub; speed; stiletto; stylet; stylette; success; success rate; supine; surgical gloves; surgical scrub; time; time factors; time interval; transcutaneous electrical acupoint stimulation; transcutaneous electrical nerve stimulation; transfer techniques; ultrasound; ultrasound guidance; ultrasound guided embryo transfer; uteri; uterus; vaginal flush; vaginal preparation.

Initially, titles and abstracts of potentially relevant articles were screened and reviewed for inclusion/

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Reprint requests: Practice Committee, American Society for Reproductive Medicine, 1209 Montgomery Hwy, Birmingham, Alabama 35216 (E-mail: [ASRM@asrm.org](mailto:ASRM@asrm.org)).

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exclusion criteria. Protocols and results of the studies were examined according to specific inclusion criteria. Only studies that met the inclusion criteria were assessed in the final analysis. Studies were eligible if they met one of the following criteria: level I or II studies that assessed the effectiveness of a procedure correlated with an outcome measure (pregnancy, implantation, or live-birth rates); meta-analyses; and relevant articles from bibliographies of identified articles. This guideline focuses principally on pregnancy rate since most of the studies report pregnancy rates rather than live-birth rates.

Three members of an independent task force reviewed the full articles of all citations that possibly matched the predefined selection criteria. Final inclusion or exclusion decisions were made on examination of the articles in full. Disagreements about inclusion among reviewers were discussed and solved by consensus or arbitration after consultation with an independent reviewer/epidemiologist.

The quality of the evidence was evaluated using the following grading system and is assigned for each reference in the bibliography:

Level I: Evidence obtained from at least one properly designed randomized, controlled trial.

Level II-1: Evidence obtained from well-designed controlled trials without randomization.

Level II-2: Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.

Level II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled trials might also be regarded as this type of evidence.

Level III: Opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees.

Systematic reviews/meta-analyses were individually considered and included if they followed a strict methodological process and assessed relevant evidence.

The strength of the evidence was evaluated as follows:

Grade A: There is good evidence to support the recommendation, either for or against.

Grade B: There is fair evidence to support the recommendation, either for or against.

Grade C: There is insufficient evidence to support the recommendation, either for or against.

Number of studies identified in electronic search and from examination of reference lists from primary and review articles: 2,086. Number of studies included: 143.

### Summary of Inclusion/Exclusion Criteria

When current meta-analyses were not available to combine existing data, selected meta-analyses of studies were performed by the American Society for Reproductive Medicine

(ASRM) Practice Committee to estimate the pooled relative risk (RR) ratios of outcomes of interest. Statistical analyses and construction of forest and funnel plots were performed with Stata version 12.1. RR ratios, and 95% confidence intervals (CIs) were calculated for each outcome. Random effects models were used for the meta-analyses. Heterogeneity was assessed with the use of the  $I^2$  test. Publication bias was assessed by constructing funnel plots. Tables listing inclusion/exclusion criteria are available online as [Supplemental Material](#).

## CLINICAL PRACTICE

### Is Patient Preparation, including Acupuncture, Relaxant, Sedation, or Antibiotics, before Embryo Transfer Necessary and Does It Affect Pregnancy and Live-birth Rates?

Over the past two decades there has been significant interest in maximizing assisted reproductive technology (ART) pregnancy rates through enhancing patient preparation prior to embryo transfer. These attempts have included acupuncture, analgesics, anesthesia, massage, transcutaneous electrical acupoint stimulation (TEAS), whole-systems traditional Chinese medicine (WS-TCM), and prophylactic antibiotics. These interventions provide theoretical benefits, which include modulating hormones, altering energy flow throughout the body, enhancing blood flow to the uterus, reducing stress, and reducing microbial colonization of the genital tract.

**Acupuncture.** Acupuncture has been the focus of significant interest and research, as it is an important tradition in Chinese medicine that dates back over 3,000 years. Acupuncture involves the insertion of fine needles through the skin intended to alter the flow of energy throughout the body. There are a variety of different acupuncture protocols based upon the underlying diagnosis. Protocols can include varying acupuncture points and treatment intervals during ovarian stimulation, retrieval, and before and after transfer.

A review of the medical literature is challenging as there is no consensus regarding a particular acupuncture protocol, and studies vary in regard to their inclusion and exclusion criteria, investigator blinding, and treatment of the control groups, including sham acupuncture.

A number of randomized controlled trials (RCTs) on acupuncture have been published with contradictory results. There are five RCTs showing some benefit of acupuncture (5–9). Anxiety levels were lower ( $P < .05$ ) and clinical pregnancy, implantation, and live-birth rates were higher ( $P < .017$ ) in the auricular acupuncture groups vs the sham auricular acupuncture and control groups in the largest of the trials, which included 305 IVF patients (7). In another trial of 273 women treated with IVF-intracytoplasmic sperm injection (ICSI), the treatment group received acupuncture on the day of embryo transfer and had a clinical pregnancy rate of 39% compared with a control group that had no acupuncture 24% ( $P = .038$ ) (9). A meta-analysis of seven trials and 1,366 patients also showed an improved clinical pregnancy rate (odds ratio [OR] 1.65, 95% CI 1.27–2.14; seven trials) and live-birth rate (OR 1.91, CI 1.39–2.64; four trials) when acupuncture was given with embryo transfer (10).

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