Profiling assisted reproductive technology: outcomes and quality of infertility management

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Objective: To critically appraise the content of the American Society for Reproductive Medicine (ASRM)/Society for Reproductive Technology (SART) Registry.

Design: English-language literature review.

Patient(s): Women undergoing treatment with assisted reproductive technology (ART).

Intervention(s): Current ART treatments, including IVF, GIFT, zygote intrafollopian transfer (ZIFT), oocyte micromanipulation, and cryopreserved embryo transfers.

Main Outcome Measure(s): Compliance with clinical practice guidelines, and casemix-adjusted rates of live delivery, clinical pregnancy, ectopic pregnancy, miscarriage, birth defects, implantation, fertilization, and retrieval.

Result(s): Outcomes should be adjusted for variation in patient characteristics known to affect prognosis, including maternal age, the duration of infertility, the presumed cause(s) of infertility, the patient’s prior history of treatment for infertility, and diethylstilbestrol exposure. Outcome rates should be reported using the patient as the denominator, as well as cycle, retrieval, and transfer. The statistical significance of observed differences in events rates should be indicated. Because widely accepted clinical practice guidelines related to performance of ART procedures are not available, compliance with practice guidelines cannot currently be assessed.

Conclusion(s): Reports based on ASRM/SART Registry data can be enhanced by refined casemix adjustment, assessing outcome rates per patient, as well as per component of ART procedure, and by providing an indication of the statistical significance of observed differences in event rates. In addition, a critical appraisal of available evidence related to particular aspects of infertility management would help clarify the areas in which there is an evidentiary basis for formulation of practice guidelines, as well as topics requiring additional clinical research. (Fertil Steril 1998;69:617–23. ©1998 by American Society for Reproductive Medicine.)

Key Words: Assisted reproductive technology, in vitro fertilization, gamete intrafallopian transfer, zygote intrafallopian transfer, outcomes, quality of care

Over the past several years, interest in evaluation of the performance of health care providers (physicians, hospitals, health maintenance organizations [HMOs], networks) has grown dramatically. Many factors are responsible for this burgeoning interest in evaluation of provider performance. They include: concerns about health care costs; skepticism about whether increasing health care costs are yielding meaningful improvements in health status; increased recognition that health care providers have not assessed systematically many aspects of their practices; concerns about an increasingly competitive health care marketplace; an increased tendency for providers to be financially ‘‘at risk’’ for the care of populations of patients; the potential quality-of-care consequences of health care cost reduction efforts; improvement in casemix adjustment and outcome measurement methodology; and growth in employers’ (and the public’s ) interest in being ‘‘value purchasers’’ (‘‘smart shoppers’’).

This heightened interest in evaluation of provider performance has resulted in a number of systematic efforts undertaken by payers, states, quasi-regulatory organizations (such as the National Committee for Quality Assurance) and some provider organizations (such as HMOs and specialty societies) to assess both the content and outcomes of care provided.
Evaluation of provider performance can be valuable to both patients and providers. It can enable patients to make informed decisions about the content of care they receive and who provides it. In addition, evaluation is critical to providers’ efforts to continually improve the quality and outcomes of care they provide to patients.

To achieve these potential benefits of evaluation of provider performance, however, the evaluations must be performed in a clinically and methodologically meaningful fashion. Doing so requires that evaluators take adequate account of factors unrelated to the care that is delivered that may influence patient outcome (e.g., patient characteristics known to affect prognosis); use as benchmarks standards of care that are based on methodologically sound studies that demonstrate that certain practices result in better patient outcomes than do other practices; use reliable, valid, and responsive measures of the outcomes of care that are meaningful to patients; and collect sufficiently large sample sizes of experience to distinguish true differences in performance from random variation. Failure to adhere to these elements of methodological rigor can result in misleading findings that can hurt providers as well as patients.

While most current efforts to evaluate health care provider performance have been undertaken directly or indirectly by health care payers, some performance assessment initiatives have been undertaken proactively by provider organizations, such as clinical specialty societies. In some instances, provider-initiated performance assessment efforts have been undertaken primarily to evaluate the comparative safety and effectiveness of alternative therapeutic interventions. In other instances, the efforts have been motivated primarily by an interest in comparing and facilitating improvement in the performance of individual providers. One area in which a clinical specialty society has played a proactive role in performance assessment is in evaluation of infertility treatment.

Many causes of infertility are now treatable with sophisticated assisted reproductive technologies (ARTs). Nonetheless, considerable uncertainty exists regarding the comparative effectiveness of available ARTs, as well as the likelihood of success of particular treatments in couples with particular clinical characteristics. This uncertainty is likely one factor contributing to substantial variation in the clinical practices used at different infertility treatment centers. However, the extent to which variations in treatment success rates reported by different centers are due to variations in clinical practices, as opposed to variations in technical skill or the way in which success rates are calculated, is poorly understood. In this article, we examine current ART techniques, how ART performance is currently evaluated, and ways in which evaluation of ART performance can be enhanced.

**OVERVIEW OF ART**

**History of ART**

Assisted reproductive technology refers to the “art and science of getting gametes together” (1). Although assisted reproduction is barely 2 decades old, current practices differ remarkably from those used 2 decades ago. Indeed, the advances in basic research and the practical applications of the research that has been performed since the first successful in vitro fertilization (IVF) in 1978 (2) have given rise to hitherto unthinkable strategies for achieving human reproduction. Innovations in gonadotropin preparations, techniques for culturing gametes and embryos, sperm and embryo cryopreservation techniques, endocrine assays, ultrasound imaging, and laparoscopic surgery all have contributed to the evolution of ARTs.

**Types of Techniques**

Although current ART practices typically involve induction of development of multiple follicles using gonadotropins, followed by retrieval of the eggs that emerge from this process, patients can undergo an IVF cycle without ovarian stimulation. In IVF, oocyte harvesting, performed either vaginally, with ultrasound guidance, or laparoscopically, is followed by oocyte insemination and, if fertilization occurs, embryo transfer. The advent of IVF was soon followed by gamete intrafallopian transfer (GIFT) (3) and zygote intrafallopian transfer (ZIFT) (4).

Gamete intrafallopian transfer, which involves the transfer of gametes to the fallopian tube immediately following oocyte retrieval, was proposed as an alternative to IVF that would allow for in vivo fertilization in patients with at least one functional fallopian tube. Zygote intrafallopian transfer typically involves the laparoscopic transfer of a fertilized oocyte, or zygote, to the fallopian tube the day following oocyte retrieval. It was developed not only to capitalize on the increased pregnancy rates achieved with GIFT but also to permit confirmation of oocyte fertilization before tubal transfer.

Many IVF techniques differ in some way from the standard IVF procedure. Variations exist, for example, in techniques used for oocyte acquisition, embryo cryopreservation, and oocyte and/or embryo micromanipulation. Oocytes can be harvested from the recipient or donated by another woman when the recipient has undergone premature ovarian failure, surgical oophorectomy, or is postmenopausal. Once oocytes are retrieved from either the recipient or a donor, they typically are inseminated with the sperm of the recipient’s partner and, if fertilization occurs, transferred to the uterus of the recipient (5).

Embryo cryopreservation technology has given couples the opportunity to freeze some or all embryos that are not transferred at the time of an IVF cycle. Cryopreserved embryos can then be thawed and transferred during a subsequent natural (nonstimulated) menstrual cycle. The development of cryopreservation technology also has stimulated...
debate regarding the appropriate number of embryos that should be transferred, balancing concerns regarding success rates against concerns regarding multiple gestation.

Microsurgical gamete manipulation is one of the latest technological advances in infertility therapy. Intracytoplasmic sperm injection (ICSI), the most recent micromanipulation technique, facilitates fertilization by injecting one sperm into the oocyte cytoplasm. Other micromanipulation techniques have included partial zona dissection and subzonal insemination (6, 7). Intracytoplasmic sperm injection has essentially replaced these latter two techniques because it has proven to be more successful in facilitating fertilization and producing pregnancy (6).

**ART Trends**

Chandra and Mosher (8) summarized trends in use of medical services for infertility using data from the national Survey of Family Growth (NSFG), a population-based survey. They reported that, while the prevalence of infertility has remained constant over the last 2 to 3 decades, the number of individuals seeking medical care for infertility has increased markedly (8). On the basis of 1988 NSFG data, Wilcox and Mosher (9) estimated that 43% of the women in the United States characterized as having impaired fecundity had obtained some type of infertility service, and 24% of these women had received specialized treatment services that included drugs for ovulation, treatment for blocked tubes, artificial insemination, or IVF.

**Cost**

Expenditures for infertility treatment in the United States in 1987 were approximately $1 billion, 7% of which were related to IVF (10). The costs associated with ART depend on several factors, including the specific ART technique that is employed, the phase of treatment for which costs are examined (e.g., an IVF cycle versus the time from initiation of ART treatment to delivery), patient eligibility criteria, the number of attempts per patient, and the perspective from which costs are estimated (e.g., the provider's costs versus the payer's costs).

The cost of IVF treatment resulting in a successful delivery increases with the number of cycles initiated, ranging from $66,667 when an initial cycle results in a live birth to $114,286 when six cycles are required (11). For patients considered to have a more favorable prognosis (e.g., tubal disease), costs have ranged from $50,000 per delivery resulting from the first cycle to $72,727 for delivery resulting from the sixth cycle. Analogous costs were $160,000 and $800,000, respectively, when the woman was older and male factor infertility was present (11). As would be expected, maternal and neonatal complications, as well as multiple births, increase costs. For example, the cost per patient among triplet and quadruplet deliveries was $340,000, nine times greater than that of singleton or twin pregnancies (12).

The proportion of costs related to IVF services that is paid out of pocket by Americans is estimated at 85% (13). This percentage greatly exceeds that in other places, such as Canada and France, where cost sharing is estimated at 15% and 7%, respectively (13). Although 13 states in the United States have laws governing insurance coverage for treatment of infertility (14), only 6 states stipulate that insurance carriers must cover IVF (15). Infertility insurance coverage varies even in states in which it is available, ranging from 100% coverage for the diagnosis and treatment of infertility to coverage for only one outpatient cycle of IVF. Not surprisingly, use of IVF services is greater in France (588 estimated IVF cycles per million population in 1993) than in the U.S. (119 estimated IVF cycles per million population in 1993) (13).

Over the next 25 years, the estimated number of U.S. women with impaired fecundity is projected to increase only slightly, if at all (16). If this prediction holds true, then future growth of ART centers will be driven by an increased inclination of infertile couples to seek treatment rather than an increased prevalence of the condition. Thus, economic factors, such as the availability of insurance coverage and the total costs borne by the patient, may have a particularly strong impact on demand for ART (17).

**CURRENT STATUS OF ASSESSMENT OF ART CENTERS**

The American Society for Reproductive Medicine (ASRM) and the Society for Reproductive Technology (SART) first reported ART practice data in 1988. That report included data for procedures performed by 41 ART clinics in the United States during 1985 and 1986. Until 1992, provision of ART data to the SART registry was voluntary. In 1992, Congress passed the Fertility Clinic Success Rate and Certification Act, which mandated creation of a federal registry of data regarding pregnancy success rates from all ART centers as well as the certification status of embryo laboratories. In collaboration with ASRM/SART, the Centers for Disease Control and Prevention have recently begun implementing the Fertility Clinic Success Rate and Certification Act of 1992.

To be a member of ASRM/SART today, an ART program must agree to submit their procedure activity data to the registry and to make their data publicly available. In addition, a data validation committee has been created that will perform site visits of ART facilities to ensure that data are being collected properly.

The most recent ASRM/SART report summarizes use and outcomes of ART procedures performed in 1994 (18). This was the first year that participating centers prospectively registered patient cycles to a centralized data collection facility. Data were reported for each cycle of treatment that was initiated. For 1994, SART reported data on 42,509 ART treatment cycles initiated at 249 centers operating in the
United States and Canada. Of these cycles, 87.8% involved either standard IVF or some variation thereof, 10% involved GIFT, and 2.2% involved ZIFT. It was estimated that 28 ART programs did not submit data for 1994 in a timely enough fashion for inclusion in ASRM/SART’s report (18).

HOW SHOULD ART PERFORMANCE BE EVALUATED?

Casemix Adjustment
To be meaningful, comparative data regarding the treatment success rates achieved by different clinical centers need to be adjusted for variations in patient characteristics that affect prognosis. Such factors include patient age, duration of infertility, the presumed cause(s) of infertility, and the patient’s history of infertility treatment.

Advanced female age not only decreases the likelihood of conception and a live birth but also increases the likelihood of a pregnancy-related complication or birth defect. There is a slight decrease in fecundity (conception rate per cycle) in women after age 30 and a marked decrease after age 35 (19). Numerous studies have demonstrated a negative association between female age and IVF success (20, 21). Advanced age also has been shown to be associated with a diminished response to ovarian stimulation, a reduction in the rate of embryo implantation (22), a decreased delivery rate per retrieval, and an increased cancellation rate for IVF and GIFT (23). Bopp et al. (23) concluded that women >43 years of age are unlikely to benefit from IVF or GIFT treatments.

The duration of infertility also influences prognosis independent of female age. Specifically, the probability of conception diminishes the longer infertility has existed before diagnosis and/or treatment.

The cause of infertility also influences patient prognosis as well as the ART technique of choice for a given couple. Infertility can be attributable to the male, the female, or both individuals. Shushan and colleagues (24) reviewed causes of infertility and reported that the effectiveness of IVF, defined in terms of pregnancy rate, has been demonstrated for only two causes of infertility: severe bilateral tubal disease and male factor infertility. In women with tubal disease, IVF provides an effective mechanism for bypassing the mechanical problem posed by absent or damaged fallopian tubes. In the case of male factor infertility, ART is effective, but less so than in the case of tubal disease.

In the most recent SART report, the rate of deliveries per retrieval for stimulated IVF cycles in women <40 years of age with male factor infertility was 20.2% compared with 24.5% among women in the same age group without male factor (18). Studies involving other causes of infertility, such as ovulation defects, immunologic factors, endometriosis, and unexplained infertility have not reported statistically significant increases in pregnancy rates with ART assistance compared to without ART assistance (24).

A patient’s history of treatment for infertility also influences prognosis. Because of selection, the probability of success decreases as the number of ART treatment cycles increases. That is, women with the highest potential for becoming pregnant are most likely to conceive during an early cycle, leaving those with a lower probability of conception to continue with subsequent cycles. As a result, a patient who has received six cycles of treatment without success has a poorer prognosis than a patient receiving ART for the first time. Consequently, to compare the effectiveness of different ART techniques or centers in the most clinically meaningful way, success rates should be reported after stratifying or otherwise controlling for the number of attempted cycles or interventions.

Finally, studies also have demonstrated that the severity of the underlying cause of infertility (e.g., endometriosis) and the number of factors contributing to infertility influence IVF success rates (25, 26).

The most recent ASRM/SART Registry results adjust for two patient-related dimensions of casemix (maternal age <40 years versus ≥40 years and presence versus absence of a male factor component to infertility) and two procedure-related dimensions of casemix (whether ovulation induction medications were used to stimulate a cycle and the specific ART technique that was employed (e.g., IVF versus GIFT versus ZIFT versus cryopreserved embryo transfers) (18). The SART statistics for 1994 confirm the adverse prognostic effects of advanced age and male factor infertility diagnosis on ART outcome.

When IVF and GIFT cycles were stratified by maternal age, the clinical pregnancy and delivery rates per procedure were higher among women <40 years of age than among women 40 years of age and above. The cancellation rate (defined as the percent of stimulated cycles initiated that did not proceed to retrieval) and the spontaneous abortion rate were higher among older than among younger women. After controlling for maternal age, couples in which there was no male factor infertility diagnosis had higher pregnancy and delivery rates than couples with a male factor infertility diagnosis (18).

Given the extensive clinical experience in the SART Registry, it is likely that the impact of maternal age on the likelihood of a delivery could be determined more precisely than simply looking at maternal age as <40 years versus ≥40 years. Specifically, the probability of a live birth could be estimated for any given maternal age, after controlling for other potential confounding factors, such as cause and duration of infertility and previous experience with ART. The potential value of more precise adjustment for variation in maternal age has been acknowledged by ASRM and SART (18).

The most recent ASRM/SART Registry results also do
not take account of variations across treatment centers in the cause of infertility other than the presence or absence of a male factor component. They also do not control for a patient’s duration of or history of treatment for infertility. Failure to adjust for a patient’s treatment history may result in misleading indications of the effectiveness of particular ARTs and of the comparative effectiveness of particular treatment centers. The latter situation is particularly likely if some clinical centers are selective in the patients they treat (e.g., by discouraging or refusing to treat patients with poorer prognoses), whereas other centers see many patients who have had unsuccessful treatment experiences at other centers.

In addition to those patient characteristics that affect the likelihood of pregnancy and delivery, there are other patient characteristics that are associated with the likelihood of an ectopic pregnancy (e.g., diethylstilbestrol exposure) or miscarriage (e.g., diethylstilbestrol exposure or fibroids or certain immunologic abnormalities). Because the ASRM/SART Registry reports ectopic pregnancy rates and the percentage of clinical pregnancies that result in miscarriage, consideration should be given to adjusting for these aspects of casemix as well.

**Content of Care**

Performance evaluation typically focuses on both the “process” and “outcomes” of care. The former relates to the extent to which individual providers or centers comply with established standards of care or preferred patterns of practice.

Minimal standards relating to general practice, personnel, and facility requirements were developed in 1984 for IVF and embryo transfer (27) and in 1988 for GIFT by the American Fertility Society (28). These standards were updated in 1990 (29). The ASRM has recently developed guidelines for the Provision of Infertility Services and Related Procedures that address practitioner qualifications and provider management obligations. These guidelines acknowledge the diversity of health care practitioners that may provide infertility treatment, but do not define patient selection criteria or provide guidelines related to appropriate diagnostic evaluation or ART procedure selection. Thus, no widely accepted clinical practice guidelines related to the performance of ART procedures are currently available.

The ASRM recently formed a committee charged with the responsibility for developing evidence-based practice guidelines that will address diagnostic and therapeutic management of infertile couples. Initially, the committee intended to develop guidelines related to management of infertility attributable to advanced maternal age, endometriosis, male factor, tubal disease, and unknown etiology. However, because of the dearth of prospective randomized controlled trials evaluating ART treatment for specific conditions, the committee has decided to focus its efforts on management of unexplained infertility and infertility resulting from endometriosis. The committee plans to consider the costs associated with ARTs when formulating its recommendations (30).

Because of the absence of evidence-based or widely accepted expert-opinion–based clinical practice guidelines, the ASRM/SART Registry currently does not report any process-related quality of care measures. Such measures would be of value, however, both in promoting provision of cost-effective care and by giving patients insight into variations in practice style that might be of interest to them. Practice guidelines and process of care-related performance measures could be developed, for example, related to:

1. what constitutes an appropriate diagnostic evaluation of couples with particular clinical characteristics (e.g., in women of what age and with what presumed cause of infertility should diagnostic laparoscopy be performed?);
2. what types of treatment are appropriate, given a patient’s presumed cause of infertility and prior treatment history (e.g., it might not be appropriate to recommend a stimulated ART cycle to an anovulatory woman unless the patient already has undergone multiple cycles of intercourse or intrauterine insemination following stimulated ovulation; or it might not be appropriate to perform ICSI unless a couple failed to achieve fertilization in a previous IVF cycle);
3. contraindications to ART;
4. the number of cycles or fertilizations it is reasonable to perform before stopping treatment for infertility (e.g., if a patient has undergone X cycles of IVF, or if there have been Y egg retrievals without successful fertilization, the risks and costs of ART may outweigh the likelihood of success);
5. compliance with particular criteria for eligibility as a recipient or oocyte donor; and
6. laboratory procedures for culturing, storing, and thawing embryos.

Opinions can vary reasonably regarding whether particular aspects of the content of infertility care should be examined as part of performance evaluation, as opposed to as part of outcomes research designed to establish what constitutes optimal patient management strategies. For example, definition of the optimal number of oocytes/embryos to transfer during a stimulated ART cycle and description of the optimal techniques for cryopreservation and thawing of embryos are appropriate topics for clinical research. If answers to such questions are established, then performance measures based on them could be developed. Alternatively, one could elect to focus one’s attention on “outcome measures” rather than on procedural details that could appropriately vary from center to center.

**Outcomes of Care**

Because ART treatment is divided into several phases, success can be defined in several ways. For example, one could examine the success rate for particular phases of ART treatment. Such “intermediate outcomes” include the “retrieval rate” (i.e., the percentage of cycles in which a re-
The "retrieval rate" (i.e., the number of oocytes that were successfully fertilized divided by the number of oocytes that were inseminated), and the "embryo transfer rate" (i.e., the percentage of patients who undergo oocyte retrieval that proceed to embryo transfer). When adequately adjusted for differences in case mix, these types of "intermediate outcomes" provide insight into the skill or efficiency with which particular components of ART treatment are provided by particular centers and give patients an estimate of the likelihood that particular phases of ART treatment will be successful. For example, in the most recent ASRM/SART report, the overall retrieval rate for standard IVF was 86%, while the overall transfer rate was 90% (18).

In addition to reporting on these "intermediate outcomes," the ASRM/SART Registry reports on more "distal" or "ultimate" outcomes, including the rates of live delivery, clinical pregnancy, ectopic pregnancy, abortion, stillbirth, congenital abnormalities, and singleton versus multiple births (16). A clinical pregnancy was defined as an ultrasound-confirmed gestational sac within the uterus. Delivery and clinical pregnancy rates were reported using the number of initiated cycles, the number of retrievals, and the number of transfers as the denominator. Cycle-specific outcomes, in turn, were reported for several ART techniques, including IVF, GIFT, ZIFT, donor oocyte, cryopreserved embryo transfers, and various combinations of procedures (18).

Reporting outcomes in this way provides insight into the comparative effectiveness and safety of different ART techniques. The clinical pregnancy rates per retrieval for IVF, GIFT, and ZIFT, for example, were 26.3%, 36.3%, and 34.8%, and the delivery rates per retrieval were 21.1%, 28.5%, and 29.1% for IVF, GIFT, and ZIFT, respectively (18). The ectopic pregnancy rate and the percentage of deliveries that were multiple births were similar for IVF, GIFT, and ZIFT. However, rates of pregnancy loss varied (19%, 22.5%, and 16.2% for IVF, GIFT, and ZIFT, respectively) (18).

Although reporting success rates per initiated cycle, retrieval, and transfer may be helpful in comparing the effectiveness of various ART techniques and in assessing the efficiency of different procedures and treatment centers, such rates do not provide the information of greatest interest to a couple considering ART or selecting an ART center. The primary outcome of interest related to performance of any ART from a clinical, as opposed to biological, perspective is the probability of a live birth. Other outcomes of interest to patients include complication rates and cost.

Put most simply, the key question of interest to an infertile couple considering ART is: Of the women who undergo ART treatment who are like me, what proportion deliver a healthy baby, with what rate of complications, and at what cost? The most recent ASRM/SART report does not report such data because patients, as opposed to cycles, retrievals, and transfers, are not used as a denominator.

One final way in which data reported by the ASRM/SART Registry could be improved relates to reporting the statistical significance of observed differences. Given the wide array of ART techniques, as well as treatment centers, available to patients, it is important when reporting comparative data to provide an indication of the likelihood that observed differences in event rates reflect true differences between techniques or centers, rather than random variation. Depending on the target audience for the data, this could be accomplished by reporting 95% confidence intervals around point estimates or simply indicating which of several reported values differ significantly from the others from a statistical perspective.

**CONCLUSION**

The evolving health care marketplace has created an increased demand for technology assessment as well as for data on the performance of particular providers. Because ART is often not covered by health insurance, and because patient demand for treatment of infertility can be very strong, ART procedures are more likely than other technologies to be incorporated into clinical practice without well-designed studies that establish their absolute or comparative effectiveness and safety. In addition, given the complexity of ART treatment and the multiplicity of ways in which performance data (regarding both success rates and complication or "undesirable event" rates) can be reported, there is a strong likelihood, in the absence of standardized reporting formats, that ART treatment centers would provide data on their performance to potential patients in varied ways, with each center providing data in a fashion that maximizes their success rates.

The ASRM and SART deserve credit for the steps they have taken to obtain standardized data on ART treatment procedures and outcomes. The value of such data, to both patients and providers, can be increased, however, if several additional steps are taken.

First, adjustments for variation in case mix can be refined in several ways. These include dealing with maternal age as a continuous, rather than dichotomous, variable and controlling for a patient’s treatment history when reporting success rates. In addition to providing fairer comparisons of the performance of different treatment centers, adjusting success rates for the number of attempted cycles or interventions also would help quantify the diminishing probability of a live birth as the number of ART attempts increases. To provide data on that probability, patients would need to be assigned a unique identification number that would enable SART to

*The "retrieval rate" is 1 – cancellation rate, where cancellation rate is defined as the percent of stimulated cycles that did not proceed to retrieval.*
In order to assess the compliance of infertility treatment centers with preferred patterns of practice, there is a need to establish and statistically meaningful way. Satisfaction of these pre-

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