Validation of a highly realistic embryo transfer simulator and trainer

Establishment of a pregnancy by assisted reproduction requires a successful embryo transfer. Although embryo implantation after transfer does not happen in all cases, even in the hands of the most highly skilled providers, data suggest that a lower implantation rate may result following embryo transfers by less skilled providers. Thus, optimal pregnancy outcomes after embryo transfer require highly skilled providers. For this reason, it is critical that trainees are provided with opportunities to finely hone and develop robust embryo transfer skills.

Unfortunately, reports suggest that embryo transfer training varies greatly across the United States. A study in 2007 (1) found that only 44% of US Reproductive Endocrinology and Infertility (REI) fellowship trainees performed embryo transfers. More recently (2), a survey of US programs in 2020 revealed that 21% of trainees performed no embryo transfers, and 42% of senior REI fellows had performed fewer than 10 procedures with live embryos. Furthermore, this survey revealed striking variability in the level of training experience across the United States. As a result of this variability, "nearly one-half of graduating fellows in REI are receiving inadequate training in embryo transfer" (2). Clearly, embryo transfer is a high-stakes procedure in assisted reproduction, and these reports indicate that training is variable and possibly suboptimal for some trainees before they progress to independent clinical practice. Therefore, the question arises "How can this be achieved without compromising pregnancy outcomes for patients?"

The logical answer is simulation. For example, the airline industry uses simulation to provide pilots with skills in challenging situations where skills can be honed without consequences. Recognizing the importance of embryo transfer skill for the specialty, the Accreditation Council for Graduate Medical Education designated the procedure as a core competency and permitted "mock or simulation" in lieu of live transfers. Unfortunately, some low-cost solutions, such as mock embryo transfer training with an intrauterine insemination catheter (3), demonstrated that mock training reduced skill acquisition rather than increasing mastery of embryo transfers. This suggests that mock transfers alone may not impart the requisite skills.

This conundrum led the American Society for Reproductive Medicine (ASRM) leadership, spearheaded by Dr. Richard Reindollar, to develop a program of embryo transfer training. The linchpin was the VirtaMed embryo transfer trainer, but the ASRM leadership went further to develop an entire educational pedagogy to support the development of skills in the procedure. In a study by Ramaiah and colleagues (4), the virtual embryo transfer simulator improved transfer skills by developing a curriculum for training, demonstrating progressive skill development and, like a flight simulator trainer, provision of a highly realistic simulator requiring coordination of ultrasound scanning with catheter manipulation.

Notably, there are four different uteri to present trainees with different challenges. Metrics are tracked by a computer, while the positions of the inner and outer catheters are monitored by ultrasound—just like in a live embryo transfer. The platform allows for different approaches to the procedure, such as the "direct transfer method" and the "afterload method." In addition to skill acquisition, trainee confidence also significantly improved, an especially important component of procedural mastery.

These results allow us to revisit the question of how to impart skills to trainees without compromising patient outcomes. The pedagogy described by Ramaiah et al. (4) suggests a logical solution: incorporate a highly realistic simulation into fellowship training. The course might be used in training programs where there is a reluctance to provide live embryo transfer experience because of the high stakes nature of the procedure. Trainees could be required to complete the course before performing live embryo transfer procedures. Another possibility is that the course might be required for trainees in programs where experience in live embryo transfer is insufficient. From the perspective of the two co-authors of this commentary, perhaps the course could be required for all REI trainees prior to graduation. Doing so would promote skill development and confidence in trainees and might address the variability that exists across the programs. Of course, a simulated embryo transfer cannot take the place of a live embryo transfer, just as a flight simulator cannot teach a pilot to fly.

Some studies have documented a learning curve for trainees in the procedure, associated with the establishment of pregnancies, which the ASRM simulator would address (5). Other studies, notably a retrospective comparison between highly supervised trainees and faculty (2), found no learning curve when pregnancy was the outcome. However, it is possible that the faculty would preferentially perform the transfers judged to be most difficult, a choice that could act as a possible confounder in this retrospective cohort. Another possible explanation proffered by the trainees is that the Northwestern University REI fellows are just unusually skilled and for this reason a learning curve was not detectable Well, maybe.

Although the report by Ramaiah et al. (4) documented differences in skill acquisition and confidence, there were some limitations. The improvement in skills was not linked to improvement in pregnancy outcome. Determining whether a correlation exists between improvement in skills and pregnancy outcome associated with the curriculum remains to be demonstrated.

James Segars, M.D. is supported, in part, by the Howard and Georgeanna Jones Endowment.

The metric validation of the ASRM simulator and trainer represents an important milestone for the field of assisted reproduction. We applaud the authors for making this seminal contribution to the training of REI fellows and for addressing this important issue in the field of assisted reproduction.

James Segars, M.D.[a]
Michael A. Thomas, M.D.[b]
[a] Department of Gynecology and Obstetrics, Division of Reproductive Sciences, Johns Hopkins University School of Medicine, Baltimore, Maryland; and [b] Department of Obstetrics and Gynecology, University of Cincinnati College of Medicine, Cincinnati, Ohio

https://doi.org/10.1016/j.fertnstert.2021.01.019

You can discuss this article with its authors and other readers at
https://www.fertstertdialog.com/posts/32207

REFERENCES

1. Wittenberger MD, Catherino WH, Armstrong AY. Role of embryo transfer in fellowship training. Fertil Steril 2007;88:1014–5.
2. McQueen DB, Robins JC, Yeh C, Zhang JX, Feinberg EC. Embryo transfer training in fellowship: national and institutional data. Fertil Steril 2020;114:1006–13.
3. Shah DK, Missmer SA, Correia KF, Racowsky C, Ginsburg E. Efficacy of intrauterine inseminations as a training modality for performing embryo transfer in reproductive endocrinology and infertility fellowship programs. Fertil Steril 2013;100:386–91.
4. Ramaiah SD, Ray KA, Reindollar RH. Simulation training for embryo transfer: findings from the American Society for Reproductive Medicine Embryo Transfer Certificate Course. Fertil Steril 2020 Dec 23, S0015–0282(20)32628-5.
5. Heitmann RJ, Hill MJ, Csokmay JM, Pilgrim J, DeCherney AH, Deering S. Embryo transfer simulation improves pregnancy rates and decreases time to proficiency in Reproductive Endocrinology and Infertility fellow embryo transfers. Fertil Steril 2017;107:1166–72.