Perceived barriers to elective single embryo transfer among IVF professionals: a national survey

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BACKGROUND: After initial years of improvement, the multiple pregnancy rate after in vitro fertilization (IVF) in Europe now remains stable at 23% with single embryo transfer (SET) constituting 19% of all IVF cycles. Although elective SET prevents multiple pregnancies after IVF, couples and professionals apparently often decide to transfer more embryos. Previous qualitative research has identified factors that impede the use of elective SET. The aim of this study was to quantify those barriers among IVF professionals and to identify predictors of professionals’ willingness to perform elective SET.

METHODS: A national survey among all Dutch IVF professionals quantified the barriers suggested by a previous qualitative study and assessed characteristics of the professionals and clinics. Multivariate analysis identified predictors related to the willingness of IVF professionals to perform elective SET.

RESULTS: In total, 107 professionals participated. The most frequently mentioned barriers to elective SET use were suboptimal success rates associated with cryopreservation (96%), not seeing twin pregnancies as a complication (79%) and lack of a SET protocol (78%). Two variables seem to predict the professionals’ willingness to perform elective SET: university hospital of the initial fertility training ($P<0.01$) and high scores of perceived barriers, e.g. professionals’ attitudes and skills ($P<0.01$). The explained variance of these two variables was 25%.

CONCLUSIONS: This study has identified the main barriers to elective SET use and predictors for willingness of professionals to perform elective SET. This insight into the decision-making process could be critical in terms of increasing the use of elective SET.

Keywords: in vitro fertilisation; single embryo transfer; shared decision-making; multiple pregnancy

Introduction

Multiple pregnancies are associated with higher rates of mortality and morbidity for both mother and child than singleton pregnancies (Helmerhorst et al., 2004; Koudstaal et al., 2000; Pinborg, 2005), and the costs of multiple pregnancies are also higher (Lukassen et al., 2004; Wolner-Hanssen and Rydhstroem, 1998). Elective single embryo transfer (eSET) prevents multiple pregnancies after in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) (Gerris et al., 2002; Lukassen et al., 2005; Pandian et al., 2005; Thurin et al., 2004). However, the use of eSET in clinical practice may also be disadvantageous. Elective single embryo transfer could result in a lower pregnancy rate per cycle (Lukassen et al., 2005; Thurin et al., 2004), especially in an unselected population (van Montfoort et al., 2006). The difficult balance between maintaining an acceptable pregnancy rate and the prevention of multiple pregnancies is probably the reason why the implementation of eSET in clinical practice has not been impressive so far. After earlier years of improvement, the multiple pregnancy rate for IVF in Europe now remains stable at 23%, while the proportion of single embryo transfers is slowly approaching 19% (Andersen et al., 2008). The question remains why eSET is not performed more often, especially for couples with good prospects of becoming pregnant.

With the exception of those for Belgium and Sweden, no national SET legislation systems or compulsory SET protocols exist (De Neubourg et al., 2006; Karlström and Bergh, 2007). This means that in most European IVF clinics the decision for the number of embryos transferred is taken by both the professional and the couple in a process of shared decision-making. To find out why it is so difficult to perform eSET, we need to obtain more insight into this decision-making...
process and the factors that influence the number of embryos transferred.

In a recent qualitative study among a selected group of IVF professionals, we identified such influential factors, which were distributed over four domains (van Peperstraten et al., 2008a). The four domains consisted of features of the eSET technique (e.g. cost-effectiveness), the professionals (e.g. attitude), the couples (e.g. financial situation) and the context in which eSET was applied (e.g. reimbursement system). To confirm these findings in a large group of IVF professionals, we conducted a quantitative study in two ways. First, we determined which of the factors found in our previous qualitative study were most frequently perceived as barriers to eSET use. Second, to interpret these perceived barriers within the whole spectrum of the IVF treatment, we also measured characteristics of the professionals and their clinics. With this approach we determined which of the barriers and characteristics predicted the professionals’ willingness to perform eSET. These predictors provide necessary insight into the complex decision for the number of embryos transferred and could be the first step for developing a strategy to improve eSET use.

Thus, the aims of this study were to quantify the barriers perceived by IVF professionals to perform eSET and to determine what variables predict the professional’s willingness to perform eSET.

Methods

Setting
In the Netherlands, IVF and ICSI are performed in 13 licensed hospitals: eight university hospitals, four general hospitals and one private clinic. Professionals in a hospital without a licence can start up and monitor the stimulation phase and refer to a licensed hospital for the oocyte retrieval and/or embryo transfer. Consultant gynaecologists and fertility doctors carry out IVF. Fertility doctors are not consultant gynaecologists, but have received IVF training at their local departments and work under the supervision of gynaecologists. The national healthcare system currently reimburses the costs of the first three fresh IVF or ICSI cycles, but only if maximally two embryos are transferred. Any transfers of cryopreserved embryos are included in the costs of the three fresh cycles. The decision for either one or two embryos is taken by both the couple and the professional in a process of shared decision-making.

Study population
We approached 65 consultant gynaecologists specialized in fertility and who are currently registered with the Dutch Society of Obstetrics and Gynaecology (NVOG). Hence we were able to invite all the consultant gynaecologists in the Netherlands because their NVOG membership is obligatory. Furthermore, we obtained the e-mail addresses of all fertility doctors who are members of the Dutch Society of Fertility Doctors (VVF). Since not all fertility doctors are registered with the VVF, we also contacted every hospital that performs IVF to find out about any other fertility doctors. This resulted in a total of 99 fertility doctors whom we invited to participate. In total, we invited 164 Dutch IVF professionals to complete our questionnaire.

Survey development and deployment
The questionnaire contained two parts. The first part consisted of 35 Likert scale items concerning the barriers to eSET use that were identified in our previous qualitative study (Van Peperstraten et al., 2008a). The five point Likert scale items ranged from total disagreement to total agreement with a particular factor as a barrier for eSET use. The second part contained 14 questions about characteristics of the professionals and their clinical settings that potentially influence the decision for eSET or double-embryo transfer (DET). Examples of the characteristics are age, gender, and the type of hospital in which the professional worked. We measured the professionals’ willingness to perform eSET by asking them: ‘For what percentage of couples, who have at least two embryos available for transfer, would you recommend eSET in the next three months?’.

We approached all doctors by e-mail in December 2007 and invited them to fill in the Web-based questionnaire. Two reminders were sent in a period of 10 weeks. This questionnaire did not accept unanswered items, so that no data were missing from the database. If participants wished to explain their answers in detail, they could do so at the end of the questionnaire.

Statistical analysis
To quantify the barriers to eSET as IVF professionals perceived them, we classified the Likert scale responses as 1 = disagree, 2 = neutral or 3 = agree and calculated the percentage of professionals who agreed that an item is a barrier for eSET use. We described the frequencies of eSET willingness and characteristics of the participants.

We used multivariate analysis to identify possible predictors of the willingness of IVF professionals to perform eSET. We calculated Cronbach’s α for each of the four barrier domains to assess their reliability. It was necessary to perform a factor analysis to select the reliable items for the domain of the professionals and the context, because the initial Cronbach’s α values were <0.5. At least six items in each domain persisted after the factor analysis, and the resulting Cronbach’s α values were 0.61, 0.62, 0.79 and 0.61 for the domains of the eSET technique, the professionals, the couples and the context, respectively. We calculated sum scores for the persisting items in each domain by adding up the scores of all ‘disagree’, ‘neutral’ and ‘agree’ categories.

The characteristics of the professionals and the clinical settings, as well as the sum scores of the four barrier domains, were tested for univariate relationship with the eSET willingness in order to select the items for the multivariate analysis. The relationship between the eSET willingness (a percentage and therefore a continuous variable) and the dichotomous characteristics was analysed with the Mann–Whitney U test, the relationship between categorical characteristics and eSET willingness was determined with a Kruskal–Wallis test and the correlation between continuous characteristics and the eSET willingness was analysed with Pearson’s correlation. Variables with \( P \leq 0.15 \) were found to be eligible for multivariate regression analysis. In the multivariate analysis the eSET willingness was the continuous dependent variable. A backward selection method was applied, and factors with \( P < 0.05 \) were considered significant. Statistical Products Services and Solutions (SPSS), version 14.0.1, Chicago, IL, was used for the statistical analyses.

Results
Of the 164 professionals approached, 107 participated; 46 consultant gynaecologists and 61 fertility doctors, with response rates of 71 and 61%, respectively. Table I shows the characteristics of the participants. The mean age, proportion of male professionals and years of experience were greater in the group of consultant gynaecologists (the supervisors) than in the group of fertility doctors. These differences reflect the standard structure.
of Dutch IVF teams with fertility doctors under supervision of consultant gynaecologists.

**Perceived barriers for eSET use among IVF professionals**

Table II shows the proportion of professionals who perceived specific barriers to eSET use. Barriers with high scores in the domain of the eSET technique were: suboptimal success rates associated with cryopreservation (96%), uncertainty about the eSET pregnancy rate per cycle (30%) and the cost-effectiveness of eSET use (28%). In the domain of the professionals, the main barriers were: not perceiving a twin pregnancy as a complication (79%), doubts about the consequences of full implementation of eSET in clinical practice (42%) and professionals feeling more responsible for the couples’ wish for pregnancy than for the extra risk to the baby’s health (23%). The couple’s reluctance to accept eSET when they had undergone DET before (44%), their desire for twins (36%), their freedom of choice to decide the number of embryos transferred (30%) and their lack of knowledge about eSET success rates and twin-related complications (29%) were the most important barriers in the domain of the couples, according to the professionals. Within the domain of the context of the IVF treatment, the absence of a protocol (78%), the head of the IVF department not encouraging eSET (66%), lack of eSET legislation (66%) and the Dutch system of reimbursement (51%) were important perceived barriers to eSET use.

Table II also shows that some potential barriers identified in our previous qualitative study (van Peperstraten et al., 2008a) were not considered important. In the domain of the eSET technique itself, lack of objective eSET results (0%), lack of opportunity to observe others performing eSET (7%) and lack of a scientific basis for eSET use (8%) all scored low as perceived barriers. Within the domain of the professionals, time investment for eSET (0%), difficulty of changing routines (4%) and lack of knowledge about or motivation for eSET (7%) were not seen as important barriers. National differences about eSET use (8%) or the potential publication of poor results (8%) were not important as barriers in the domain of the context of the IVF treatment.

**Predictors of professionals’ willingness to perform eSET**

The willingness of the 107 IVF professionals to perform eSET ranged from 0 to 100% with a median value of 70%. Table III shows the variables selected for the multivariate analysis to identify predictors of professionals’ eSET willingness. Among the professionals’ characteristics, only previous positive experiences with twins ($P = 0.03$), the university hospital of initial fertility training ($P = 0.06$) and their opinions about the minimum pregnancy rate that must be maintained while preventing twin pregnancies ($P = 0.08$) were eligible...
for multivariate analysis. Among the characteristics of the clinical setting, only the presence of a protocol \((P = 0.06)\) and the number of IVF cycles performed annually \((P = 0.09)\) were included in the multivariate model. With respect to the sum scores of the four domains of barriers, the domain of the eSET technique \((P = 0.02)\) and the domain of professionals \((P < 0.01)\) were used for multivariate analysis.

Within this multivariate analysis, two of the seven variables from the univariate analyses seemed to predict eSET willingness of the IVF professionals. First, the university hospital of initial fertility training of the professionals was of significant importance \((P < 0.01)\); it influenced a professional’s willingness to perform eSET. Second, the sum score of the barriers in the domain of the professionals significantly predicted the willingness of professionals to use eSET \((P < 0.01)\).

A higher sum score, which implies more barriers perceived by the professional, makes it less likely that a professional will perform eSET. If, for instance, a professional believes that prevention of twin pregnancies is unnecessary or considers cryopreservation success rates too low, then he or she will tend to use eSET less often than professionals who perceive fewer barriers in daily practice. The explained variance of the two variables was 25%.

**Discussion**

The results of our national survey show that most Dutch IVF professionals perceive different barriers for eSET use in clinical practice in the domains of the eSET technique, the professionals, the couples and the context of IVF treatment. Furthermore, we have shown that the university hospital of initial fertility training and barriers perceived in the domain of the IVF professionals are predictors of the willingness of IVF professionals to perform eSET. The barriers to eSET use and the predictors of eSET willingness provide necessary insight into the decision-making process for the number of embryos transferred.

In the domain of the eSET technique, our survey demonstrates that 96\% of the participating Dutch professionals felt that suboptimal success rates associated with cryopreservation impede the use of eSET. Although previous research has shown that the results of cryopreservation in other countries are good (Thurin et al., 2004; Veleva et al., 2006), apparently a majority of Dutch professionals agree that improvement of the current Dutch cryopreservation results would stimulate the use of eSET. Furthermore, lower pregnancy rates per cycle and low cost-effectiveness created uncertainty about eSET and its full implementation. The reports of eSET success rates per cycle from earlier studies (Lukassen et al., 2005; Pandian et al., 2005; Thurin et al., 2004; van Montfoort et al., 2006) and eSET cost-effectiveness (Lukassen et al., 2004; Wolmer-Hanssen and Rydstroem, 1998) were obviously not enough to convince professionals. In the professionals’ domain, high barrier scores mainly reflected the attitude of the professionals toward twin pregnancies as a complication, the consequences of eSET use and the obligation to fulfil the couple’s wish for pregnancy despite the risks for the babies. Previous studies report comparable results (Gleicher and Barad, 2006; Iaconelli Junior et al., 2007; Porter and Bhattacharya, 2005; van Wely et al., 2006). However, a recent study among Nordic professionals revealed a more positive view, which suggests that a change in professional attitude is possible (Bergh et al., 2007). In the domain of the patients, professionals observed a desire of the couples for twins, which may partially stem from their earlier experiences with DET (Van Peperstraten et al., 2008b). The couples may also have lacked knowledge about eSET success rates and twin-related complications (Kalra et al., 2003; Pinborg et al., 2003). Our previous qualitative study among IVF couples revealed that this desire for twins was not so much a desire for two babies, but more a wish to maximize the chances of becoming pregnant (Van Peperstraten et al., 2008a). In the domain of the context of IVF treatment, we identified barriers at two levels. At the level of the local clinic, the lack of a protocol or absence of a head of the IVF department who favours eSET impeded its use. At the national level, professionals perceived lack of legislation and the current Dutch reimbursement system as barriers. If eSET legislation or compulsory SET protocols exists, the opportunity for DET is no longer an option and this will have significant impact on eSET implementation (De Neubourg et al., 2006; Karlström and Bergh, 2007).

If adapted to the specific local clinical setting, the perceived barriers for eSET identified in this study could be the first step for the development of a strategy to improve the implementation of eSET, especially if it took into account the predictors for eSET willingness of the professionals. Such a strategy could help to achieve optimal eSET use, particularly since Dutch IVF professionals seem to be open to suggestions to reduce the multiple pregnancy rate with eSET. Our study shows that IVF professionals are motivated to use eSET, feel
that they are informed about eSET developments and results and do not worry about time investment or changing their routine. Examples of strategies to increase the use of eSET could include: improvement of cryopreservation results and a focus on twin-related risks and twin prevention for IVF professionals. For patients, we could consider improving their knowledge of the essential aspects of eSET and twin risks. Previous research has shown that this could result in a change of attitude in favour of eSET (Newton et al., 2007; Ryan et al., 2007).

We have shown that the university hospital where the professional receives initial fertility training and the perceived barriers in the domain of the professionals are significantly related to willingness of professionals to perform eSET. The explained variance of these two variables is 25%, which implies that a large proportion of a professional’s willingness to use eSET is influenced by these two characteristics. It seems that focusing on changing the training of professionals and their attitudes towards eSET could significantly improve their willingness to perform eSET.

One strong point of our study is that the questionnaire was based on the factors identified by our previous qualitative study (van Peperstraten et al., 2008a). This method assures that the survey is not merely testing the authors’ personal hypothesis, but truly represents the complete spectrum of the eSET implementation problem. Such methodology might be a good example for future care evaluations. Another strong point is that we measured the eSET willingness within the complete context of the decision-making process. We combined the perceived barriers in a model with characteristics of the professional and the clinic so that we could determine which factors predict the willingness to perform eSET. Yet another strong point is the national setting of our study, with participation rates of 71% for the consultant gynaecologists and 61% for the fertility doctors.

However, this national setting could also be seen as a limitation. A different context (e.g. presence of legislation) exists in other countries, and the Dutch IVF professionals may perceive different barriers from those perceived elsewhere. Nonetheless, most of the barriers are probably not specifically related to the Dutch setting, so that the results of this study may be valid for other countries. Furthermore, our Dutch evaluation of the eSET implementation problem could be an example for other settings as well. A second limitation is that we were not able to objectively measure the frequency of eSET use by each individual professional. In our current clinical practice, a couple undergoing IVF is treated by several professionals, which makes it impossible to link an individual professional to the specific choice of a couple for the number of embryos transferred. Therefore, we had to determine the hypothetical willingness for eSET. However, we measured a broad spectrum of values of professionals’ eSET willingness ranging from 0 to 100%, and this represents the expected differences in eSET attitude and use (Gleicher and Barad, 2006; van Peperstraten et al., 2008a; Van Wely et al., 2006). A third limitation is that couples also participate in the decision for the number of embryos transferred, and they have a substantial impact on the decision since most Dutch IVF clinics allow this. Optimal implementation of eSET will probably not be achieved without taking barriers perceived by the patients into account.

In conclusion, this study has identified the main perceived barriers to eSET use among IVF professionals, and it has shown that the university hospital of initial fertility training and the personal experiences of professionals substantially influence the willingness of professionals to perform eSET. With this knowledge, we could design an implementation strategy to increase eSET use and reduce the multiple pregnancy rate. Moreover, such a strategy could be most effective if barriers perceived by the patients were also taken into account.

Funding
The Netherlands Organisation for Health Research and Development (ZonMw) funded this project (Grant no. 945-16-105).

Acknowledgements
The authors would like to thank all the professionals who generously participated with our survey.

References


Submitted on May 21, 2008; resubmitted on July 25, 2008; accepted on August 4, 2008.