Nurses performing embryo transfer: the development and results of the Birmingham experience

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Although in-vitro fertilization treatment is doctor-led, many of its steps are performed by nurses. The embryo transfer step, however, is performed exclusively by doctors in the majority of units. In our unit, doctors performed embryo transfers from June 1994 until December 1995 (period I). From January 1996 until May 1997 (period II) the nurses, after appropriate training, performed the procedure. When they experienced difficulties during the mock transfer performed immediately before the real transfer, or if they were not available to do the procedure, a doctor performed it. In period I, 488 embryo transfers were performed (all by doctors), with a pregnancy rate per transfer of 35% and an implantation rate of 16%. In period II, 522 embryo transfers were performed. Nurses performed 371 (71%) and doctors 151 (29%) of the procedures. The pregnancy rate per nurse-transfer was 40.2% and per doctor-transfer 41%. The corresponding implantation rates were 16.9% and 17%. None of these differences were statistically significant (P > 0.05). These data indicate that, with appropriate training and medical back-up, nurses can perform the majority of embryo transfers with ease and outcome comparable to that of doctor embryo transfer.

Key words: embryo transfer/in-vitro fertilization/nurses

Introduction

In the UK, as well as in many other countries, the person with overall clinical responsibility for providing in-vitro fertilization (IVF) treatment has to be a registered medical practitioner (HFEA, 1993). However, many steps of the IVF treatment process are performed by nurses. These include patient education, counselling, coordination of treatment, ultrasound ovarian monitoring and early pregnancy scanning. Furthermore, nurses have long performed intrauterine insemination (IUI) in artificial insemination–husband (AIH) and donor insemination (DI) programmes (D’Andrea, 1984). Yet embryo transfer has been performed exclusively by doctors in the majority of units in the world. This was the policy at the Birmingham Assisted Conception Unit until January 1996 when, after appropriate training, nurses started to perform embryo transfer. This paper describes the development of this nurse-led transfer policy, the training leading to it and the results compared with an historic as well as concurrent control of doctor-transfer.

Materials and methods

Patients

The study population consisted of all IVF treatment cycles with fresh embryo transfer at the Birmingham Assisted Conception Unit between June 1, 1994 and June 1, 1997 (n = 1010). This was divided into period I (during 1994 and 1995) and period II (during 1996 and 1997). In period I, 488 cycles were included and all embryo transfers were performed by doctors. In period II, 522 cycles were included and the embryo transfer was performed primarily by a nurse. A doctor performed the transfer when difficulty was encountered by the nurse during the immediate mock transfer (see below), or as a primary operator when a nurse was not available.

The causes of infertility were as follows: tubal disease, 43%; male factor, 32%; ovulatory dysfunction, 5%; endometriosis, 7%; and unexplained infertility, 13%. The mean (± SD) of the female partners’ age was 33.5 years (±4.6) and the distribution of the ages was as follows: <31 years, 23%; 31–35, 38%; >35–<40, 31%; and ≥40, 8%. There were no statistically significant differences in the causes of infertility or the female partners’ ages between the two study periods. There were also no statistically significant differences in these parameters between those patients who had doctor or nurse embryo transfer in period II (data not shown).

Treatment protocol

Our protocols for pituitary desensitization, ovarian stimulation and monitoring, egg collection and gamete handling were as previously described (Sharif et al., 1995a,b, 1996, 1997). Gonadotrophin releasing hormone analogue (Nafarelin®; Syntex, Berkshire, UK), 200 µg three times daily via nasal spray, was used for pituitary desensitization (long protocol; starting from the mid-luteal phase of the previous cycle), followed by ovarian stimulation with human menopausal gonadotrophin (Metrodin HP®; Serono, Welwyn Garden City, UK). Ovarian response was monitored using vaginal ultrasound scan and human chorionic gonadotrophin (Profasi®; Serono) 10 000 units were administered 36 h prior to ultrasound-directed oocyte recovery.

The number of embryos transferred was decided by each couple individually. The issues of multiple pregnancy and pregnancy rate were discussed with the couple during their initial consultation with the clinician and subsequent counselling with the nurse, and a decision was reached before the start of the treatment cycle. The maximum number of embryos transferred was three. Embryo transfer was performed 48–54 h following oocyte retrieval and progesterone (Gestone, Paines and Byrne, Surrey, UK) 100 mg/day (intramuscular) was given for luteal support. A urinary pregnancy test was performed 2 weeks following the embryo transfer and, if positive, a scan was performed at 4 weeks post-transfer. A clinical pregnancy was defined as that with an intrauterine fetal heart motion on ultrasound scan.
The implantation rate was calculated by dividing the number of intrauterine sacs with fetal heart motion by the total number of embryos transferred.

Embryo transfer

Immediate mock embryo transfer

This was performed by all operators (i.e. whether doctors or nurses) immediately before the real embryo transfer (Sharif et al., 1995b). The patient was instructed to attend for the transfer with a full bladder and placed in the modified lithotomy position. The cervix was exposed with a bivalve Cusco’s speculum and wiped clean with cotton wool. An empty Embryon® catheter (Rocket of London, Watford, UK) was introduced through the cervix. This catheter has an inner soft catheter (made of Estane, a polyethylene derivative) sitting in, and protruding from, an outer smooth sleeve (made of low density polyethylene) which is more rigid and has high ‘memory’ characteristics. If the catheter passed easily, it was introduced until the first black marking on the outer sheath was at the level of the external cervical os. This black marking is 6 cm from the catheter tip, and thus indicated that the catheter tip was in mid cavity. If the catheter could not be passed, then the rigid outer sleeve was passed over the inner catheter and an attempt was made to pass it through the vaginal canal into the uterine cavity. If that was successful, the catheter was then forwarded through the outer sleeve. If the outer sleeve did not pass easily, and the operator considered (from the direction and position of the cervix) that the uterus was acutely ante- or retroverted, the outer sleeve was bent in the anticipated direction of the uterus and the mock transfer attempted again.

If the mock transfer was successful (i.e. the catheter was passed with ease using the above steps), the real transfer was then performed. If the mock transfer was not successful and the primary operator was a nurse, a doctor was called to perform the transfer.

The same steps were attempted by the doctor and, if still unsuccessful, a Jansen–Anderson embryo transfer catheter (Cook, Queensland, Australia) was used. This is a coaxial catheter with an outer bulb tip cannula (2 French) and an inner silicon transfer catheter (lumen: 0.5 mm). Initially the cannula was inserted without the catheter. A malleable obturator (Cook) was inserted in the cannula (where it provided rigidity without protruding from the tip) and both were introduced through the cervix. The cannula and obturator could be angled to follow the curvature of the uterine cavity. After the cannula had been introduced successfully into the uterus, the obturator was removed with the cannula left in situ, with its tip about 1 cm from the fundus.

If the doctor thought appropriate, a vulsellum was applied to the cervix and manipulated to make the uterine canal axial and facilitate the transfer. The nurses did not use a vulsellum.

If this was unsuccessful, then ultrasound-directed transvaginal transmyometrial embryo transfer was performed as described previously (Sharif et al., 1996).

Of the 1010 embryo transfers reported here, 941 (93.2%) had the transfer performed using the Embryon® catheter. In 20 cases (2%), the use of a vulsellum was also needed and in 30 (3%) the Jansen–Anderson catheter was used. The remaining 19 (1.8%) patients needed ultrasound-directed transvaginal transmyometrial embryo transfer.

Embryo transfer technique

After a successful mock transfer using the Embryon® catheter, the catheter was removed and loaded microscopically with the embryos in approximately 10–20 µl of culture medium. The embryos were held at a point approximately 0.5 cm from the catheter tip, so that expulsion of between 0.02 and 0.04 ml of the medium would carry them out of the catheter. The catheter was then gently introduced transcervically into the endometrial cavity as described above. The embryos were then gently expelled from the catheter which was removed slowly (over 2–4 s) and checked for inadvertent retention of embryos.

If the mock transfer was done with the Jansen–Anderson catheter, then the cannula would still be in the uterus. The inner catheter was then loaded with the embryos and introduced through the cannula until the marking on the catheter indicated that its tip was just protruding from the tip of the cannula. The embryos were then gently expelled from the catheter which was removed, together with the outer cannula, and checked for inadvertent retention of embryos.

Details of ultrasound-directed transvaginal transmyometrial embryo transfer using the Towako needle (Cook, Queensland, Australia) were described previously (Sharif et al., 1996).

Following the transfer, the patient was allowed to get up immediately, empty her bladder, and go home. No advice for bed rest was given (Sharif et al., 1995a), and she was asked to continue with her daily activities as usual.

Personnel and training

There were four doctors and two nurses performing the embryo transfer. Three of the doctors had prior experience (at least 1 year) in embryo transfer. The fourth doctor and the nurses had no prior experience in embryo transfer but were experienced in IUI. Their training in embryo transfer consisted of observing at least five transfers and then performing at least five cases under direct supervision (i.e. an experienced doctor present in the room during the transfer). The fact that an immediate mock transfer was performed as a routine meant that the operator knew for sure in every case if the transfer would be easy before loading the embryos. Also, medical back-up by an experienced doctor was always available in the unit at the time of embryo transfer.

Statistical analysis

Categorical data (pregnancy; clinical pregnancy) were analysed using χ² statistics and continuous data (number of embryos transferred; implantation rate) were analysed using unpaired t-test. Logarithmic transformation was used to produce acceptable Gaussian distribution where necessary. The software StatView® (version 4.5, Abacus Concepts, CA, USA) was used for all analyses and statistical significance was assumed at P < 0.05.

Results

During the study period I, 488 IVF cycles reached embryo transfer, and all were performed by doctors. In period II, 522 cycles reached embryo transfer, which was performed by nurses in 371 (71%) of them. In the remaining 151 (29%) the transfer was performed by a doctor, either as a primary operator (when a nurse was not available) or because difficulty was encountered by the nurse during the immediate mock transfer. The mean (±SD) number of embryos transferred was 2.4 (±0.6); this was the same for period I and period II. It was also the same for nurses’ and for doctors’ embryo transfer.

Table I shows the outcome of embryo transfers by the defined time-periods. There was no statistically significant difference in either the pregnancy rate, the clinical pregnancy rate, or the implantation rate. Table II shows the breakdown of the outcome of embryo transfers in period II by operator (nurses/doctors). Again, there was no statistically significant difference in any of these outcome measures.
Discussion

Nurses play a fundamental role in caring for infertile couples. It has long been argued that the nurse, by virtue of her gender (most nurses being females) and training, is more likely to be capable of providing sensitive and empathic support to infertile women as well as education and counselling to the couple (Marshak, 1993). This multidimensional role has also extended to encompass skills as a manager, coordinator and researcher in assisted reproductive technologies in general (James, 1992) and IVF in particular (Pace-Owens, 1985). In fact, in many IVF units nurses are the professional group with whom couples have most contact during treatment. Increasing the skills of infertility nurses (with prior IUI experience) to do embryo procedures and performing five under direct supervision were adequate for our nurses to reach competence. In fact, training the nurses to encompass skills as a manager, coordinator and researcher was not revealed by the clinical pregnancy rate. Furthermore, the nurses did not describe in detail the training programme the nurses had to undergo, which is an important issue for other units that may wish to implement nurse embryo transfer. All these additional issues are addressed in our paper.

As shown in Table II, comparing the 371 nurse-transfers with the 151 doctor-transfers in period II, there was no difference in the pregnancy, clinical pregnancy, or implantation rates. This shows that the nurses have managed to do at least 71% of the transfers easily with favourable outcome. We believe that this may be due to our immediate mock embryo transfer protocol which allows the nurses to identify the difficult transfer (and call the doctor) actually before the real transfer is attempted with the embryos.

This, however, should not be misinterpreted as that difficult transfers have the same outcome as easy transfers. Unfortunately, we do not have the breakdown of how many of those doctor-transfers were done primarily by doctors (when no nurse was available) or after the nurse had experienced difficulty in the immediate mock transfer. Furthermore, most transfers for which doctors were called were performed easily with the steps described above. Also the use of ultrasound directed transvaginal transmyometrial embryo transfer helped to overcome very difficult transfers (Sharif et al., 1996).

This was not a prospective randomized trial and, thus, does not produce a ‘pure’ controlled comparison between nurse- and doctor-transfer. However, using an historic control, there was no difference between the outcome of embryo transfers performed (all by doctors) in period I and those performed by nurses in 71% of cycles) in period II (Table I). The fact that the female ages and the mean number of embryos transferred were similar in both periods lends credence to this comparison, however short it falls of the gold standard of a randomized trial. Nevertheless, we support the performance of a randomized trial between ‘intention to’ perform transfer by doctor and by nurse. Until such trial results are available, our study provides the best available evidence.

The nurses’ training for embryo transfer and the implication for their practice are issues worth considering. All our nurses were experienced in IUI, which meant they were competent in inserting self-retaining vaginal speculum, exposing the cervix, and inserting a catheter through the cervical canal into the uterine cavity. These are basically the technical steps performed at embryo transfer. Therefore, observing five procedures and performing five under direct supervision were adequate for our nurses to reach competence. In fact, training infertility nurses (with prior IUI experience) to do embryo transfer is no different from training doctors. Many infertility nurses perform IUI in AIH and DI programmes (D’Andrea, 1984), but for those without such experience a longer training programme may be necessary. During the training period our patients were told that the operator (whether it was a nurse or

Table I. Outcome of embryo transfer by time-period

<table>
<thead>
<tr>
<th></th>
<th>Period I</th>
<th>Period II</th>
<th>Statistical difference</th>
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<tbody>
<tr>
<td>Embryo transfers</td>
<td>488</td>
<td>522</td>
<td></td>
</tr>
<tr>
<td>Pregnancies</td>
<td>170</td>
<td>211</td>
<td></td>
</tr>
<tr>
<td>Clinical pregnancies</td>
<td>136</td>
<td>157</td>
<td></td>
</tr>
<tr>
<td>Pregnancy rate/embryo transfer</td>
<td>35%</td>
<td>40.4%</td>
<td>NSc</td>
</tr>
<tr>
<td>Clinical pregnancy rate/embryo transfer</td>
<td>27.9%</td>
<td>30.1%</td>
<td>NS</td>
</tr>
<tr>
<td>singleton</td>
<td>62%</td>
<td>73%</td>
<td>NS</td>
</tr>
<tr>
<td>multiple</td>
<td>38%</td>
<td>27%</td>
<td>NS</td>
</tr>
<tr>
<td>Implantation rate</td>
<td>16%</td>
<td>16.9%</td>
<td>NS</td>
</tr>
</tbody>
</table>

Table II. Outcome of embryo transfer by operator (nurse/doctor) in period II (96/97)

<table>
<thead>
<tr>
<th></th>
<th>Nurses</th>
<th>Doctors</th>
<th>Statistical difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embryo transfers</td>
<td>371</td>
<td>151</td>
<td></td>
</tr>
<tr>
<td>Pregnancies</td>
<td>149</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Clinical pregnancies</td>
<td>109</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Pregnancy rate/embryo transfer</td>
<td>40.2%</td>
<td>41%</td>
<td>NSa</td>
</tr>
<tr>
<td>Clinical pregnancy rate/embryo transfer</td>
<td>29.4%</td>
<td>31.8%</td>
<td>NS</td>
</tr>
<tr>
<td>singleton</td>
<td>68%</td>
<td>81%</td>
<td>NS</td>
</tr>
<tr>
<td>multiple</td>
<td>32%</td>
<td>19%</td>
<td>NS</td>
</tr>
<tr>
<td>Implantation rate</td>
<td>16.9%</td>
<td>17%</td>
<td>NS</td>
</tr>
</tbody>
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*NS = non-significant (P > 0.05).
a doctor) was in training and that an experienced operator would be present in the room all through the procedure. No patient expressed her objection to that or asked for a doctor instead of a nurse (or vice versa) to do the transfer. The performance of the immediate mock embryo transfer and the presence of experienced medical back-up when needed are, in our opinion, very important factors to the success of our programme of nurse embryo transfer. Although this programme increases continuity of care for patients and job-satisfaction for nurses, it should be recognised that it places extra commitments and time implication on the nurses. These should be taken into account when planning such a programme.

The contributions of nurses to infertility programmes has expanded dramatically in recent years, to the extent that it has been coined as ‘the birth of a specialism’ (Trevelyan, 1990) and officially recognised in the UK by the formation of the Infertility Nurses Group of the Royal College of Nursing. Our study has shown that, with appropriate training and medical back-up, nurses can perform embryo transfer with good outcome similar to that obtained by doctors.

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References

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