Assisted reproductive technology in Europe, 2007: results generated from European registers by ESHRE

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BACKGROUND: This 11th European IVF-monitoring report presents the results of assisted reproductive technology (ART) treatments initiated in Europe during 2007.

METHODS: From 33 countries, 1029 clinics reported 493 184 treatment cycles: IVF (120 761), ICSI (256 642), frozen embryo replacement (91 145), egg donation (15 731), preimplantation genetic diagnosis/preimplantation genetic screening (4638), in vitro maturation (660) and frozen oocytes replacements (3607). Overall, this represents a 7.6% increase since 2006, mostly related to an increase in all registers. IUI using husband/partner’s (IUI-H) and donor (IUI-D) semen was reported from 23 countries: 142 609 IUI-H (+6.2%) and 26 088 IUI-D (+7.2%).

RESULTS: In 18 countries where all clinics reported, 376 971 ART cycles were performed in a population of 425.6 million (886 cycles per million). The clinical pregnancy rates per aspiration and per transfer were 29.1 and 32.8% for IVF, and 28.6 and 33.0% for ICSI. Delivery rate after IUI-H was 10.2% in women aged 40 years. In IVF/ICSI cycles, 1, 2, 3 and ≥4 embryos were transferred in 21.4, 53.4, 22.7 and 2.5% of cycles, with no decline in the number of embryos per transfer since 2006. The proportion of multiple deliveries (22.3: 21.3% twin and 1.0% triplet), did not decrease compared with 2006 (20.8%) and 2005 (21.8%). In women < 40 years undergoing IUI-H, twin deliveries occurred in 11.7% and triplets in 0.5%.

CONCLUSIONS: In comparison with previous years, the reported number of ART cycles in Europe increased in 2007; pregnancy rates increased marginally, but the earlier decline in the number of embryos transferred and multiple births did not continue.

Key words: European Society of Human Reproduction and Embryology / assisted reproduction technology / intrauterine insemination / register data

Introduction

This report is the 11th annual European Society of Human Reproduction and Embryology (ESHRE) publication on European data on assisted reproductive technology (ART). The 10 previous reports, also published in Human Reproduction (ESHRE, 2001a,b, 2002, 2004, 2005, 2006, 2007, 2008; Nyboe Andersen et al., 2009; de Mouzon et al., 2010), covered treatment cycles from 1997 to 2006.

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As in the last report, the printed version contains the four most important tables. Additional tables are available online, making the whole report consistent with those from previous years. In the published report, these tables will be referred as ‘Supplementary data, Tables SI–SXXVIII’. The main results of this report were presented at the annual ESHRE congress in Rome, July 2010.

Materials and Methods

Data collection

Data on ART have been collected from 33 European countries, covering IVF, ICSI, frozen embryo replacement (FER), egg donation (ED), in vitro maturation (IVM), pooled data on preimplantation genetic diagnosis (PGD) and preimplantation genetic screening (PGS) and frozen oocyte replacements (FOR). In addition to ART, data on intrauterine inseminations using husband/partner’s semen (IUI-H; 22 countries, 2 more than in 2006) and donor semen (IUI-D; 18 countries, as in 2006) were also included. The report includes treatments started between the 1 January and the 31 December 2007. Follow-up data on pregnancies and deliveries are cohort data, based on the reported cycles.

The forms were the same as in 2006, making all tables comparable. As in previous years, data were directly entered in ESHRE’s computer system by each country co-ordinator, through software developed by ESHRE. Data analysis was performed in ESHRE headquarters by V. Goossens.

Results

Participation

The present report includes data from an additional country (Bosnia) (Table I). The proportion of reporting clinics (86%, 1029 out of 1204 clinics, listed in Supplementary data) was the same as in 2006. In 18 countries, the coverage, as in 2006, reached 100%. Two countries (Ireland and Switzerland) were able to report data from all but a single Centre, but participation was limited (25–50%) in six others (Bosnia, Bulgaria, Hungary, Lithuania, Poland and Serbia) and very low (≤25% of clinics) in Greece and Latvia.

Number of treatment cycles

In total, 493,184 cycles were reported, 34,425 more than in 2006 (+7.5%). Among the 377,403 fresh cycles (+7.8%), 120,761 were IVF (+2.9%) and 256,642 ICSI (+10.3%). The proportion of ICSI thus reached 68.0% of ‘fresh’ ART cycles (66.5% in 2006). The proportion of FER cycles compared with ‘fresh’ cycles was 24.2%—a figure comparable to the figure of 2006 (24.6%). The number of ED cycles, reported by 22 countries, increased more than that observed in fresh IVF/ICSI cycles, reaching 15,731 (+24.4%), the main contributor being Spain (79,885 cycles, +22%). PGD was reported by 14 countries, with fewer cycles (4638, −29.3%) recorded in 2007. The main reason was absence of data from Turkey, who contributed 23,082 cycles in 2006. Higher rates of IVM were reported (660, +267% compared with 2006). Finally, 3607 FOR cycles were reported (+1.0%), the majority from Italy (n = 2994). Table I also shows the number of cycles per million women of reproductive age (15–45 years) and per million inhabitants, in the 18 countries where data coverage was 100%. The highest availability of ART cycles was reported from Nordic countries, particularly in Denmark (14,067 and 2558), followed by Belgium, Finland, Iceland, Sweden, Norway and Slovenia, all of which provided over 8000 per million women aged 15–45 years and 1700 cycles per million inhabitants, respectively. More details are reported in Supplementary data, Table SI.

Reporting methods and size of the clinics

Among the 18 countries with complete reporting (Supplementary data, Table SII), the register was compulsory for 14 [10 held by a National Health Authority (NHA) 3 by a medical organization (MO) and 1 by personal initiative] and voluntary for 4 (three held by a MO and one by a NHA). Only seven registers were based on individual forms, i.e. cycle by cycle.

Among the 15 countries with partial coverage, 6 were held by an NHA/NGO and 3 were based on individual forms.

The distribution of clinics according to the number of cycles varied considerably among the countries (Supplementary data, Table SIII).

For example, in Italy 44.1% of the clinics provided fewer than 100 cycles annually, whereas in Belgium and in the Netherlands 61% of the clinics performed more than 1000 cycles a year.

Pregnancies and deliveries after treatment

Table II shows pregnancy and delivery rates per aspiration for IVF, ICSI and FER. Three countries provided outcome only per embryo transfer, while three did not provide data on deliveries. Thus the mean pregnancy rate and delivery rate were computed for countries providing the relevant information. There were huge variations across the countries. On average, pregnancy rates were 29.1% (+0.1% compared with 2006) and 28.6% (−1.3%) per aspiration for IVF and ICSI, and 20.1% per thawing for FER (+1.0%). Mean delivery rates per aspiration (per thawing for FER) were 21.1, 20.2 and 13.5%, respectively (−0.4, +1.8 and +0.8%). The detailed numbers of cycles, aspirations, transfers, pregnancies, deliveries and the corresponding rates per technique are reported in Supplementary data, Table SIV for IVF, Supplementary data, Table SV for ICSI and Supplementary data, Table SVI for FER.

In total, 96,690 babies were recorded as having been born in the 29 countries where the reporting from IVF, ICSI and FER included newborns (+8185). In countries with complete reporting, the percentage of babies conceived through ART varied from 0.5% of the national births in Turkey to 4.9% in Denmark. More details are provided in Supplementary data, Table SI, showing that the percentage of ART babies was above 3.0% in most of the Nordic countries, whereas this percentage was between 1.2 and 1.8% in the largest European countries (Germany, France, UK and Italy).

ED was reported by 22 countries (Supplementary data, Table SVII). In total, 6628 clinical pregnancies (+1112) resulted from 143,34 embryo transfers (+1649), with pregnancy rates of 46.2% per transfer versus 43.5% in 2006. The mean delivery rate was 30.8% per transfer (n = 4448) in the 21 countries reporting deliveries.

Age distribution

The age distribution of women treated with IVF varied across countries (Supplementary data, Table SVIII). In four countries, more than 20% of women were aged 40 years or more (Greece, Ireland, Italy and Switzerland), whereas it was ≤5% in Albania, Poland and Slovenia. As expected, pregnancy rates decreased with age, from
| ART in European countries in 2007. | IVF clinics in the country | Treatment cycles | Cycles/million* |
|-----------------------------------|---------------------------|-----------------|----------------|
|                                   | Total | Reporting | IVF | ICSI | FER | ED | IVM | PGD | FOR | All | Women 15–45 years of age | Population |
| Albania                           | 3     | 1         | 66  | 79   | 16  |     |     |     |     | 161 |                        |            |
| Austria                           | 26    | 26        | 1172| 4050 | 306 | 0   |     |     |     | 5528| 3252                     | 674         |
| Belgium                           | 18    | 18        | 3852| 1357 | 7499| 751 |     |     |     | 24499| 12230                    | 2352        |
| Bosnia                            | 5     | 2         | 31  | 131  | 0   |     |     |     |     | 162 |                        |            |
| Bulgaria                          | 15    | 7         | 574 | 708  | 79  | 0   | 0   | 0   | 0   | 1369|                        |            |
| Cyprus                            | 7     | 5         | 482 | 823  | 155 | 112 | 2   | 16  |     | 1590|                        |            |
| Czech Republic                    | 24    | 24        | 1947| 7225 | 4169| 1221| 498 |     |     | 15060| 6845                     | 1476        |
| Denmark                           | 23    | 23        | 6054| 4981 | 2668| 140 | 111 | 113 |     | 14067| 14067                    | 2558        |
| Finland                           | 18    | 18        | 2931| 1793 | 3529| 314 | 23  | 25  | 320 | 8935| 11169                    | 1718        |
| France                            | 104   | 104       | 20211| 31635| 14772| 742 | 88  | 124 |     | 67572| 5363                     | 1061        |
| Germany                           | 118   | 118       | 11811| 33371| 17140|     |     |     |     | 62322| 3944                     | 756         |
| Greece                            | 38    | 9         | 829 | 1360 | 193 | 92  | 5   | 9   | 15  | 2503|                        |            |
| Hungary                           | 10    | 5         | 594 | 1843 | 620 | 48  | 0   | 6   | 17  | 3128|                        |            |
| Iceland                           | 1     | 1         | 215 | 174  | 244 | 32  | 0   | 0   | 0   | 665 | 11083                    | 2217        |
| Ireland                           | 7     | 6         | 1768| 1096 | 692 | 9   | 0   | 0   |     | 3565|                        |            |
| Italy                             | 202   | 202       | 8792| 31213| 709 |     |     |     | 2994| 43708| 3834                     | 751         |
| Latvia                            | 4     | 1         | 104 | 75   | 113 | 60  | 0   | 0   |     | 352 |                        |            |
| Lithuania                         | 4     | 2         | 181 | 198  | 46  |     |     |     |     | 425 |                        |            |
| Macedonia                         | 3     | 3         | 504 | 475  | 29  |     |     |     |     | 1008| 2520                     | 504         |
| Montenegro                        | 2     | 2         | 25  | 253  | 253 |     |     |     |     | 278 | 2780                     | 397         |
| Norway                            | 11    | 11        | 2805| 2794 | 2250| 0   | 22  | 0   | 0   | 7871| 8746                     | 1711        |
| Poland                            | 38    | 17        | 237 | 4639 | 2238| 347 | 51  | 3   | 751 |     |                        |            |
| Portugal                          | 22    | 22        | 1536| 2969 | 524 | 101 | 0   | 115 |     | 5236| 2380                     | 494         |
| Russia                            | 69    | 55        | 12568| 9269 | 3084| 1367| 299 | 382 | 14  | 26983|                        |            |
| Serbia                            | 12    | 6         | 670 | 450  | 6   |     |     |     |     | 1126|                        |            |
| Slovenia                          | 3     | 3         | 885 | 1997 | 521 | 7   | 0   | 16  | 2   | 3428| 8570                     | 1714        |
| Spain                             | 182   | 111       | 3476| 31023| 9089| 7985| 28  | 2785| 234 | 54620|                        |            |
| Sweden                            | 16    | 16        | 5423| 4768 | 4500| 281 | 6   | 83  |     | 15061| 8859                     | 1673        |
| Switzerland                       | 26    | 25        | 1038| 3465 | 3312| 0   | 0   | 0   | 0   | 7815|                        |            |
34.0% through 26.5–13.9% for women aged ≤34, 35–39 years and ≥40 years, respectively, and the same trend was seen for delivery rates (26.2, 19.5 and 9.2%, respectively). Similar findings were found for ICSI (Supplementary data, Table SIX). For FER (Supplementary data, Table SX), only 12.6% of women were aged 40 years or more at transfer. In ED (Supplementary data, Table SXI), the recipient was aged 40 years or more in 55.3% of cases on average, and only a few countries had a proportion lower than 50%: Albania (37.5%), Belgium (41.3%), Denmark (35.0%), Hungary (31.6%), Serbia (33.3%), Sweden (9.2%) and Ukraine (44.1%). Pregnancy and delivery rates in oocyte recipients were comparable across different age groups.

Number of embryos transferred and multiple deliveries

Table III shows the number of embryos transferred after IVF and ICSI combined. The total percentage of single embryo transfers (SETs) was 21.4% (22.1% in 2006), double embryo transfers (DETs) 53.4% (57.3% in 2006), triple embryo transfers 22.7% (19.0% in 2006) and four or more embryo transfers 2.5% (1.6% in 2006). Information about numbers of elective single transfers is not yet available. As indicated in this table, major differences were seen between countries. In 2007, several countries reported a high number of SETs. The highest levels were found in Sweden (69.9%), Finland (57.8%) and Belgium (50.2%). The proportion of triple embryo transfers ranged from zero in Sweden to 58.6% in Greece. Transfer of four or more embryos ranged from zero in 10 countries and >1% in 3 to 18.3% in Macedonia.

In fresh cycles, the percentages of multiple deliveries were 21.3% for twins (19.9% in 2006) and 1.0% for triplets (0.9% in 2006). After FER, the percentages were 13.1% for twin deliveries (13.4% in 2006) and 0.3% for triplets (0.4% in 2006). Additional data on pregnancy outcome, singleton and multiple deliveries are provided in Supplementary data, Table SXII (for fresh cycles) and Supplementary data, Table SXIII for FER.

Risks and fetal reductions

Supplementary data, Table SXIV shows the risk of preterm deliveries according to the number of newborn. Data were available from 15 countries. It shows that the risk of extreme preterm birth (gestational Week 20–27) increases from 1.0% for a singleton delivery, to 3.2% for twins and 11.8% for triplets. The same trend was noted for very preterm (28–32 weeks), from 2.7 to 11.1 and 35.7%, respectively, and for preterm (33–36 weeks), from 9.2 to 38.3 and 44.5%, respectively.

Ovarian hyperstimulation syndrome (OHSS) was reported in 26 of the 33 countries (Supplementary data, Table SXV). In total, 2470 cases of OHSS were recorded, corresponding to a risk of OHSS of 0.7% in those countries (0.8% in 2006) of all stimulated cycles. Supplementary data, Table SXV also includes other adverse outcomes, such as fetal reductions (n = 364).

Preimplantation genetic diagnosis/ preimplantation genetic screening

PGD/PGS activity was recorded from 14 countries (Table I) and involved 4638 cycles, 4274 aspirations, 2882 embryo transfers and 706 deliveries (16.5% per aspiration), the main contributors being Spain (2785 cycles).
### Table II  Results after ART in 2007.

| Country          | Cycles IVF + ICSI | IVF Aspirations | IVF Pregnancies per aspiration (%) | IVF Deliveries per aspiration (%) | ICSI Aspirations | ICSI Pregnancies per aspiration (%) | ICSI Deliveries per aspiration (%) | FER | Thawings FER | FER Pregnancies per thawing (%) | FER Deliveries per thawing (%) | ART infants* per national births (%) |
|------------------|-------------------|-----------------|------------------------------------|-----------------------------------|------------------|-------------------------------------|-----------------------------------|-----|----------------|---------------------------------|-----------------------------------|----------------------------------|
| Albania          | 145               | 65              | 40.0                               | 33.8                              | 78               | 37.2                                | 29.5                              |     | 306           | 30.7                            |                                   | 64                               |
| Austria          | 5222              |                 |                                    |                                   |                  |                                     |                                   |     |                |                                 |                                   |                                  |
| Belgium          | 3852              | 29.8            | 22.4                               | 12 357                            | 28.4             | 20.6                                | 7499                             | 15.3 | 11.3          | 4925                            | 4.1                               |                                  |
| Bosnia           | 162               | 28              | 32.1                               | 14.3                              | 114              | 19.3                                | 12.3                              |     |                |                                 |                                   | 19                               |
| Bulgaria         | 1282              | 532             | 33.8                               | 25.6                              | 675              | 31.6                                | 25.8                              | 79  | 15.2          | 8.9                             | 378                               |                                  |
| Cyprus           | 1305              | 457             | 39.2                               | 40.2                              | 0.0              |                                     |                                   |     |                |                                 |                                   |                                  |
| Czech Republic   | 11 035            | 5819            | 26.1                               | 21.3                              | 4952             | 26.0                                | 21.3                              | 2668 | 16.5          | 13.5                            | 3156                              | 4.9                              |
| Denmark          | 4724              | 2830            | 27.3                               | 20.6                              | 1759             | 27.9                                | 22.4                              | 3475 | 21.2          | 16.0                            | 1875                              | 3.2                              |
| Finland          | 20 211            | 24.6            | 19.2                               | 31 635                            | 25.9             | 20.5                                |                                   |     |                |                                 |                                   |                                  |
| Greece           | 21 182            | 10 995          | 29.4                               | 16.0                              | 32 124           | 28.2                                | 16.1                              | 17 140| 18.3          | 9.9                             | 10 483                            | 1.5                              |
| Greece           | 2189              | 780             | 36.8                               | 26.5                              | 1295             | 32.8                                | 24.2                              | 193  | 22.8          | 14.0                            | 764                               |                                  |
| Hungary          | 2437              | 544             | 27.4                               | 21.5                              | 1787             | 28.2                                | 22.8                              | 620  | 23.1          | 13.2                            | 776                               |                                  |
| Iceland          | 215               | 25.1            | 21.9                               | 174                               | 28.2             | 23.0                                |                                   |     |                |                                 |                                   |                                  |
| Ireland          | 2864              | 1466            | 33.9                               | 27.4                              | 974              | 29.0                                | 26.3                              | 692  | 22.4          | 15.5                            | 958                               |                                  |
| Italy            | 40 005            | 7570            | 22.0                               | 15.2                              | 28 075           | 22.0                                | 14.3                              | 709  | 14.7          | 8.3                             | 6575                              | 1.2                              |
| Latvia           | 179               | 104             | 42.3                               | 75                                | 29.3             |                                     |                                   | 113  | 7.1           |                                 |                                   | 20                               |
| Lithuania        | 979               | 491             | 30.3                               | 24.2                              | 461              | 29.1                                | 21.0                              | 29   | 31.0          | 20.7                            | 287                               | 1.2                              |
| Montenegro       | 278               | 24              | 20.8                               | 20.8                              | 246              | 22.8                                | 20.3                              |     |                |                                 |                                   | 66                               | 0.8                              |
| Norway           | 5599              | 2685            | 30.2                               | 26.1                              | 2703             | 27.3                                | 23.2                              | 2250 | 19.7          | 16.0                            | 1509                              |                                  |
| Poland           | 4876              | 220             | 33.2                               | 28.2                              | 4547             | 35.4                                | 29.0                              | 2238 | 20.9          | 16.0                            | 2164                              |                                  |
| Portugal         | 4496              | 1329            | 30.6                               | 23.7                              | 2692             | 27.9                                | 20.4                              | 524  | 16.4          | 11.8                            | 1186                              | 1.2                              |
| Russia           | 2 1837            | 12 171          | 35.2                               | 24.1                              | 9002             | 33.1                                | 20.4                              | 3084 | 23.9          | 14.9                            | 7197                              |                                  |
| Serbia           | 1 120             | 648             | 24.5                               | 17.3                              | 426              | 34.5                                | 29.8                              |     |                |                                 |                                   | 277                              |
| Slovenia         | 2882              | 844             | 33.9                               | 25.7                              | 1932             | 28.5                                | 23.7                              | 521  | 18.8          | 14.2                            | 913                               | 4.6                              |
| Spain            | 34 499            | 3041            | 34.6                               | 34.6                              | 27 905           | 33.6                                | 23.1                              | 9089 | 12.647        |                                 |                                   |                                  |
| Sweden           | 10 191            | 50 11           | 32.0                               | 24.7                              | 4500             | 28.4                                | 22.4                              | 4500 | 23.2          | 17.2                            | 3260                              | 3.1                              |
| Switzerland      | 4503              | 886             | 28.1                               | 20.9                              | 3235             | 27.4                                | 20.1                              | 3312 | 18.7          | 12.6                            | 1467                              |                                  |
| The Netherlands  | 16 163            | 8399            | 27.6                               | 20.5                              | 6659             | 31.8                                | 25.1                              | 4616 | 2.5           |                                 |                                   |                                  |
| Turkey           | 785               | 34601           |                                     |                                   |                  |                                     |                                   |     |                |                                 |                                   | 5262                             | 0.5                              |
| Ukraine          | 3946              | 1790            | 40.3                               | 29.8                              | 2028             | 37.4                                | 30.9                              | 579  | 29.2          | 22.8                            | 1812                              |                                  |
In vitro maturation

IVM was recorded in 11 countries, three more than in 2006 (Table I). A total of 660 aspirations (241 in 2006) were recorded, resulting in 74 pregnancies and 44 deliveries (6.7% per aspiration).

Intra-uterine inseminations

Table IV provides data on IUI-H and IUI-D, reported by 23 countries (one more than in 2006), with 1 country reporting only donor insemination (Sweden), whereas 5 countries did not report/practice IUI-D (Albania, Bosnia, Italy, Lithuania and Serbia).

For non-donor insemination (IUI-H), 142,609 cycles were reported (+8,348), the main contributors being France, Italy and Spain. Among the countries reporting deliveries, the mean delivery rate was 9.2% per cycle (+0.7), 11.4% of deliveries being twin (+0.8%) and 0.6% triplet deliveries (−0.2%).

For donor insemination (IUI-D), 26,088 cycles were reported (+1,749), the main contributors being Denmark, Spain and France. The delivery rate was 13.8% per cycle (+1.4%), with multiple delivery rates similar to IUI-H.

Data were also divided in two female age groups, below 40 years (upper panel) and 40 years or more (lower panel), both for IUI-H (Supplementary data, Table SXVI) and IUI-D (Supplementary data, Table SXVII). For France, stratification for age was not possible. The delivery rate associated with IUI-H declined with age (10.2% below 40 years versus 6.3% above), and the multiple delivery rate decreased slightly from 11.7 to 9.9% for twins, and from 0.5 to 0.0% for triplets.

Similar findings were seen in IUI-D, where delivery rates decreased from 14.6 to 6.1%, twin deliveries from 10.2 to 6.5%, and triplets from 0.5 to 0.0%.

Cumulative delivery rates

Supplementary data, Table SXVIII gives an estimation of the cumulative delivery rates per initiated fresh stimulated cycle. This is not the true cumulative delivery rate per couple per cycle but shows the number of deliveries obtained from the FER cycles added to the deliveries from the stimulated cycles during the same year. Additionally, the table shows the rate of multiple deliveries after the ‘fresh’ cycles and the FER combined. It shows that adding the deliveries after FER increases the delivery substantially (Finland +11.8%, Iceland +12.8%, Sweden +7.7% and Switzerland +9.2%). The overall multiple delivery rate was particularly low in Sweden and Finland: 5.3 and 10.9%, respectively, with relatively high cumulative DR (29.7 and 32.5%).

Discussion

The present report is the 11th consecutive, annual European report on ART data. Together, these reports cover treatment cycles from 1997 to 2007. It can be argued that as long as data are incomplete, lack uniformity in terms of clinical definitions and are generated through different methods of data collection, they should be interpreted carefully, and the focus should primarily be on specific country data. Nevertheless, summary data reveal important trends in practice and outcomes.

As seen in the tables, registers from a number of countries have been unable to provide some of the data. In order to standardize
| Country         | IVF + ICSI | Transfers | 1 embryo (%) | 2 embryos (%) | 3 embryos (%) | 4 + embryos (%) | Deliveries | Twin (%) | Triplet (%) | Deliveries | Twin (%) | Triplet (%) |
|-----------------|------------|-----------|--------------|---------------|---------------|----------------|------------|----------|------------|------------|----------|------------|
| Albania         | 131        | 25.2      | 29.0         | 44.1          | 1.5           | 45             | 17.8       | 2.2      |            |            |          |            |
| Austria         | 4912       | 20.3      | 68.7         | 9.8           | 1.2           |                |            |          |            |            |          |            |
| Belgium         | 14876      | 50.2      | 39.6         | 8.4           | 1.7           | 3386           | 11.8       | 0.3      |            |            | 845      | 13.1       | 0.1       |
| Bosnia          | 123        | 49.6      | 13.8         | 25.2          | 11.4          | 18             | 5.6        | 0.0      |            |            |          |            |           |
| Bulgaria        | 1126       | 8.3       | 35.6         | 44.2          | 11.9          | 310            | 14.8       | 1.6      |            |            | 7        | 14.3       | 0.0       |
| Cyprus          |            |           |              |               |               |                |            |          |            |            |          |            |           |
| Czech Republic  |            |           |              |               |               |                |            |          |            |            |          |            |           |
| Denmark         | 9226       | 39.6      | 55.7         | 4.5           | 0.1           | 2298           | 16.6       | 0.1      |            |            | 361      | 14.1       | 0.0       |
| Finland         | 4131       | 57.8      | 41.9         | 0.3           | 0.0           | 977            | 11.3       | 0.2      |            |            | 560      | 9.6        | 0.2       |
| France          | 44453      | 23.2      | 62.3         | 13.2          | 1.3           | 10359          | 18.9       | 0.4      |            |            | 1913     | 11.3       | 0.2       |
| Germany         | 41615      | 12.5      | 66.9         | 20.6          | 0.0           | 6950           | 21.2       | 0.6      |            |            | 1702     | 15.1       | 0.6       |
| Greece          | 1852       | 11.9      | 19.3         | 58.6          | 10.3          | 521            | 25.7       | 0.8      |            |            | 27       | 3.7        | 0.0       |
| Hungary         | 2146       | 10.1      | 45.3         | 35.7          | 8.9           | 524            | 22.5       | 2.1      |            |            | 82       | 18.3       | 0.0       |
| Iceland         | 322        | 46.6      | 46.0         | 7.5           | 0.0           | 87             | 17.2       | 0.0      |            |            | 50       | 12.0       | 0.0       |
| Ireland         | 2221       | 13.6      | 77.4         | 9.0           | 0.0           | 658            | 24.3       | 0.9      |            |            | 107      | 17.8       | 0.0       |
| Italy           | 30780      | 20.4      | 30.5         | 49.1          | 0.0           | 5158           | 20.6       | 2.8      |            |            | 59       | 6.8        | 1.7       |
| Latvia          | 173        | 15.0      | 53.8         | 31.2          | 0.0           |                |            |          |            |            |          |            |           |
| Lithuania       |            |           |              |               |               |                |            |          |            |            |          |            |           |
| Macedonia       | 750        | 23.9      | 26.9         | 30.9          | 18.3          | 216            | 26.4       | 1.4      |            |            | 6        | 33.3       | 0.0       |
| Montenegro      | 258        | 14.3      | 32.2         | 41.1          | 12.4          | 55             | 16.4       | 1.8      |            |            |          |            |           |
| Norway          | 4821       |           |              |               |               |                |            |          |            |            |          |            |           |
| Poland          | 4338       | 16.6      | 67.9         | 15.1          | 0.4           | 1382           | 20.3       | 0.6      |            |            | 359      | 12.8       | 0.0       |
| Portugal        | 3585       | 17.4      | 69.2         | 13.3          | 0.2           | 863            | 21.6       | 0.9      |            |            | 62       | 17.7       | 0.0       |
| Russia          | 19310      | 16.2      | 39.6         | 19.8          | 4.4           | 4526           | 26.0       | 1.5      |            |            | 460      | 17.2       | 1.7       |
| Serbia          | 911        | 13.3      | 77.1         | 6.9           | 2.7           | 239            | 8.8        | 3.3      |            |            |          |            |           |
| Slovenia        | 2462       | 27.6      | 69.7         | 2.6           | 0.0           | 674            | 23.0       | 0.0      |            |            | 74       | 6.8        | 0.0       |
| Spain           | 27155      |           |              |               |               |                |            |          |            |            |          |            |           |
| Sweden          | 8529       | 69.9      | 30.1         | 0.0           | 0.0           | 2246           | 4.6        | 0.1      |            |            | 776      | 6.7        | 0.1       |
| Switzerland     | 3731       | 12.8      | 65.3         | 21.9          | 0.0           | 830            | 18.9       | 0.5      |            |            | 417      | 12.0       | 0.7       |
| The Netherlands | 13375      |           |              |               |               |                |            |          |            |            |          |            |           |
| Turkey          | 31808      | 11.5      | 24.1         | 52.8          | 11.7          | 3727           | 32.9       | 4.1      |            |            |          |            |           |
| Ukraine         | 3510       | 11.3      | 44.2         | 33.1          | 11.4          | 1160           | 25.0       | 1.6      |            |            | 132      | 22.7       | 0.0       |
| United Kingdom  | 31114      | 12.8      | 82.3         | 4.9           | 0.0           | 9094           | 24.1       | 0.3      |            |            | 1548     | 17.6       | 0.3       |
| All*           | 263681     | 21.4      | 53.4         | 22.7          | 2.5           | 63617          | 21.3       | 1.0      |            |            | 11212    | 13.1       | 0.3       |

*Totals refer only to these countries where data on number of transferred embryos and on multiplicity were reported. Transfers: data on transfers not available for Austria, Cyprus, Czech Republic, Lithuania, Norway, Spain and The Netherlands. Belgium: 6 more cycles without data (not included), Russia: 1878 more cycles without data (not included), Switzerland: 1 more cycle without data (not included). FER: for 1 delivery multiplicity is not known. Belgium, IVF + ICSI: for 21 deliveries, multiplicity is not known, FER: for 8 deliveries multiplicity is not known. Russia, IVF + ICSI: for 243 deliveries multiplicity is not known, FER: for 47 deliveries multiplicity is not known. Turkey: underestimation of the deliveries, no data for FER.
Table IV  Intrauterine insemination with husband (IUI-H) or donor (IUI-D) semen in 2007.

| Country         | IUI-H Cycles | Deliveries | Deliveries (%) | Singleton (%) | Twin (%) | Triplet (%) | IUI-D Cycles | Deliveries | Deliveries (%) | Singleton (%) | Twin (%) | Triplet (%) |
|-----------------|--------------|------------|----------------|--------------|----------|-------------|--------------|------------|----------------|---------------|----------|-------------|
| Albania         | 36           | 4          | 11.1           | 100.0        | 0.0      | 0.0         | 0            | 36         | 4              | 11.1          | 100.0    | 0.0         |
| Austria         |              |            |                |              |          |             |              |            |                |               |          |             |
| Belgium         |              |            |                |              |          |             |              |            |                |               |          |             |
| Bosnia          | 108          | 21         | 19.4           | 85.7         | 9.5      | 4.8         |              |            |                |               |          |             |
| Bulgaria        | 846          | 72         | 8.5            | 90.3         | 9.7      | 0.0         |              |            |                |               |          |             |
| Cyprus          |              |            |                |              |          |             |              |            |                |               |          |             |
| Czech Republic  |              |            |                |              |          |             |              |            |                |               |          |             |
| Denmark         | 9176         | 1112       | 12.1           | 86.1         | 13.8     | 0.2         | 6254         | 749        | 12.0           | 90.0          | 9.9      | 0.1         |
| Finland         | 3782         | 318        | 8.4            | 93.7         | 6.0      | 0.3         | 822          | 112        | 13.6           | 93.8          | 6.3      | 0.0         |
| France          | 49240        | 4923       | 10.0           | 88.1         | 11.4     | 0.5         | 4307         | 661        | 15.3           | 86.4          | 13.0     | 0.6         |
| Germany         |              |            |                |              |          |             |              |            |                |               |          |             |
| Greece          | 936          | 123        | 13.1           | 97.6         | 2.4      | 0.0         | 234          | 36         | 15.4           | 100.0         | 0.0      | 0.0         |
| Hungary         | 2112         | 203        | 9.6            | 82.3         | 15.8     | 0.2         | 176          | 28         | 15.9           | 82.1          | 17.9     | 0.0         |
| Iceland         |              |            |                |              |          |             |              |            |                |               |          |             |
| Ireland         | 1217         | 138        | 11.3           | 90.6         | 8.7      | 0.7         | 170          | 39         | 22.9           | 82.1          | 10.3     | 7.7         |
| Italy           | 31551        | 2076       | 6.6            | 88.2         | 10.7     | 1.1         |              |            |                |               |          |             |
| Latvia          | 36           |            |                |              |          |             |              |            |                |               |          |             |
| Lithuania       | 610          |            |                |              |          |             |              |            |                |               |          |             |
| Macedonia       | 773          | 53         | 6.9            | 90.6         | 9.4      | 0.0         | 33           | 7          | 21.2           | 85.7          | 14.3     | 0.0         |
| Montenegro      |              |            |                |              |          |             |              |            |                |               |          |             |
| Norway          | 380          | 35         | 9.2            | 96.9         | 3.1      | 0.0         | 165          | 26         | 15.8           | 84.6          | 15.4     | 0.0         |
| Poland          | 5534         | 565        | 10.2           | 93.6         | 6.2      | 0.2         | 1139         | 162        | 14.2           | 93.8          | 6.2      | 0.0         |
| Portugal        | 1719         | 152        | 8.8            | 88.2         | 11.8     | 0.0         | 236          | 50         | 21.2           | 84.0          | 14.0     | 2.0         |
| Russia          | 3697         | 465        | 12.6           | 89.8         | 9.8      | 0.4         | 1534         | 233        | 15.2           | 88.0          | 11.1     | 0.0         |
| Serbia          | 161          | 12         | 7.5            | 91.7         | 0.0      | 8.3         |              |            |                |               |          |             |
| Slovenia        | 625          | 41         | 6.6            | 92.7         | 4.9      | 2.4         | 8            | 1          | 12.5           | 100.0         | 0.0      | 0.0         |
| Spain           | 22917        | 2059       | 9.0            | 84.8         | 14.5     | 0.6         | 5917         | 831        | 14.0           | 86.6          | 12.8     | 0.6         |
| Sweden          |              |            |                |              |          |             |              |            |                |               |          |             |
| Switzerland     |              |            |                |              |          |             |              |            |                |               |          |             |
| The Netherlands |              |            |                |              |          |             |              |            |                |               |          |             |
| Turkey          |              |            |                |              |          |             |              |            |                |               |          |             |
| Ukraine         | 1365         | 125        | 9.2            | 93.6         | 5.6      | 0.8         | 741          | 139        | 18.8           | 92.8          | 7.2      | 0.0         |
| United Kingdom  | 5788         |            |                |              |          |             |              |            |                |               |          |             |
| All*            | 142609       | 12497      | 9.2            | 88.0         | 11.4     | 0.6         | 26088        | 3601       | 13.8           | 89.0          | 10.5     | 0.5         |

For the UK: the Human Fertilisation and Embryology Authority only started collecting data for IUI-H from 05/07/2007 onwards. The number of IUI-H cycles submitted for the UK (5788) is therefore not for a full year. Data on deliveries were removed for Lithuania.

*Total refers to these countries where data were reported and mean percentage were computed for countries with complete information. IUI-H: For Austria, Belgium, Cyprus, Czech Republic, Germany, Iceland, Montenegro, Sweden, Switzerland, The Netherlands and Turkey, no data available. France: 1187 cycles excluded due to unknown age of women, in 90 deliveries multiplicity is not known. Ireland: one clinic did not provide data. Italy: underestimation of the number of deliveries due to lost follow-up. Norway: in three deliveries multiplicity is not known. Russia: For 24 deliveries multiplicity not known. UK: no data on deliveries. IUI-D: For Austria, Belgium, Bosnia, Cyprus, Czech Republic, Germany, Iceland, Italy, Lithuania, Montenegro, Serbia, Switzerland, The Netherlands and Turkey; no data available. France: for 6 deliveries multiplicity is not known. Russia: For 25 deliveries multiplicity is not known. Sweden: in 72 deliveries multiplicity is not known.
With the World Health Organization (Zegers-Hochschild et al., 2006a,b), and recently reviewed with the World Health Organization (Zegers-Hochschild et al., 2009a,b). It is likely that these recommendations were not perfectly implemented in all reporting countries in 2007, meaning that, as in every registry report, the data must still be interpreted with some caution.

In 2007, the number of countries reporting to ESHRE's EIM Consortium increased to 33, covering the whole of Western Europe. Bosnia joined the Consortium from this year but reporting was patchy in Eastern and South Eastern Europe. No data were available from Estonia, Romania and Slovakia, and Croatia was unable to provide data for 2007.

In 2007, the coverage was 86.0% of all clinics—a figure similar to 2006. However, the coverage was still low in a few countries, such as Greece (9 of 50 clinics), Poland (17 of 38 clinics) and Spain (111 of 182 clinics). The implementation of new regulations may result in an improvement in the coming years.

Overall, the number of reported cycles increased by 7.8% since 2006—reaching a total of 493 184. This was due an overall increase in ART, rather than more intensive coverage, as participation remained at the same level and only a few cycles were contributed by the new country that joined the Consortium. The present report also includes data from almost 169 000 IUI cycles—9000 more than the previous report. The implementation of new regulations may result in an improvement in the coming years.

As shown in Table I in countries with a full report, the average number of treatment cycles per million inhabitants ranged from 397 in Montenegro to 14 067 in Denmark. A better way to define the availability of ART is to report ART cycles in women of reproductive age (15–49 years), which eliminates the impact of age differences across the countries (Table I). Again, there were huge differences, from 1994 cycles per million women in Turkey, to 14 067 in Denmark (Table I). Finally, the percentage of newborns conceived through ART varied from 0.5% in Turkey to 4.9% in Denmark (Supplementary data, Table S1). It is difficult to explain those differences which may be related to several factors, such as cost, reimbursement, legal or social aspects, as well as medical strategies relating to the use of ART. These issues also may play a role in the differences observed between treatment cycles per million women in Turkey, and delivery rates between countries.

A further question relates to the choice of a suitable denominator in reporting outcomes per cycle. There is general agreement in favour of reporting the number of deliveries (or clinical pregnancies) per initiated cycle. However, from Supplementary data, Tables SIV and SV, it can be noticed that the cancellation rate (average 8.4% for IVF and 5.9% for ICSI) shows huge variations (from 0 to 17%), making it difficult to compare outcomes of started cycles. Efforts still need to be made to better register initiated cycles if we want to analyse this marker.

The proportion of ICSI versus conventional IVF procedures continues to increase (49% in 2004, 66.5% in 2006 and 68% in 2007). A similar trend has been observed in the USA (Jain and Gupta, 2007). As recently reviewed, the trend towards increased use of ICSI has been observed throughout the world (Nyboe Andersen et al., 2008; ICMART et al., 2009). In Australia and New Zealand, 61.8% of all cycles used ICSI in 2007 and in the USA the corresponding figure was 63%, so there is a uniform development in those three regions. However, within Europe a marked variation exists regarding the distribution between IVF and ICSI. As can be seen in Table I, 11 countries used ICSI in more than 75% of cases, the highest being Turkey (97.8%). In contrast, in the Nordic countries, the Netherlands, Russia, Ireland, the UK, and a few other countries, IVF remains the dominant technology. As recently analysed (Nyboe Andersen et al., 2008), the marked increase in the use of ICSI cannot be explained by a similar increase in male infertility but rather to a more liberal use of this technique in cases with mixed caused of infertility, unexplained infertility, mild male factor infertility and fertilization failures. Thus, the observed differences can be at least partly explained by differences in professional strategies and clinical decision making.

The trend towards the transfer of fewer embryos was no longer observed in 2007 and cycles where three or more embryos were transferred increased from 20.6 to 25.2% (Table III). The mean percentage of SETs decreased from 22.1% in 2006 to 21.4%, and the proportion of DETs decreased by almost 4% since 2006. However, these findings were mostly explained by the inclusion of data from Turkey, which contributed a large number of treatment cycles. Turkey had not reported the number of transferred embryos in 2006 but, in 2007, 52.8 and 11.7% of transfers involved three and four or more embryos. Exclusion of these data reveals the overall percentages of transfers of 1, 2, 3, and 4 or more embryos to be 22.8, 57.5, 18.5, and 1.2%, respectively, which are more in keeping with the trend seen over the last 10 years.

The same explanation can be given for the increase in multiple pregnancies (21.3% twins and 1.0% triplets). When recalculating data after excluding Turkish ART data, the mean percentages were 20.5 and 0.8%. Thus, the remarkable reduction in triplet deliveries observed previously may persist (3.6% in 1997 to 0.8% in 2007).

There are clearly many differences across the countries. As seen in Table III, five countries reported transfer of a SET in more than 45% of all transfers (one more than in 2006): Sweden (69.9%), Finland (57.8%), Belgium (50.2%), Bosnia (49.6%) and Iceland (46.6%), all with an increase from 0.3 to 11.5% since 2006. In contrast, more than 10% of transfers involved four or more embryos in seven countries (Bosnia, Bulgaria, Greece, Macedonia, Montenegro, Turkey and Ukraine), and the transfer of three embryos reached 58% in Greece, 53% in Turkey and 49% in Italy. This resulted in 4.1 and 32.9% triplet and twin deliveries in Turkey.

In comparison with the situation in Europe, data from other registries show that SET was performed in 63.7% of cycles in Australia and New Zealand (AIHW, 2009), and in 9.4 and 13.1% of transfers at Day 3 and 5, respectively, in the USA (CDC, 2009). This report is unable to discriminate between elective SET (eSET) versus SET in general but the rise in the number of transfers of one
embryo is undoubtedly related to a rise in eSET and not a rise of cycles with only one embryo obtained.

As evident from Table III, major differences in triplet rates are still evident across countries. We have included data describing preterm birth rates according to the number of fetuses of the pregnancy (Supplementary data, Table SXIV), which was provided by 15 countries. The risk of extreme preterm birth (<28 weeks) was increased 3-fold for twins and by almost twelve fold for triplets. The risk of very preterm (28–32 weeks) birth was increased almost four for twins and 13-fold for triplets.

Fetal reductions are always performed in triplet or higher order gestations. Thus, when analysing the range of triplet delivery rates in different countries, the number of fetal reductions should also be considered. A total of 364 procedures were reported (82 fewer than in 2006). However, the total number is likely to be an underestimate since several countries, including large countries such as France, Germany and the UK, did not report fetal reductions in 2007. Without this intervention, the proportion of triplet deliveries would have been much higher than the number of recorded triplet deliveries (615 in total), given that a number of countries did not report on fetal reductions.

Finally, delivery rates per aspiration showed a marginal increase for IVF (21.9%) and ICSI (19.9%) compared with figures from 2006 (21.5 and 18.4%), as did the delivery rate per thawing for FER (13.5% in 2007 versus 12.7% in 2006).

The delivery rates in Europe remain lower than in the USA where 33.3 and 32.5% of aspirations for IVF and ICSI, respectively, from non-donor cycles resulted in a delivery (CDC, 2009).

However, the delivery rates in Europe are very similar to those achieved in Australia and New Zealand, where the delivery rate per transfer was 23.9% after fresh cycles and 16.0% after FER transfers in 2007 (AIHW, 2009).

The effect of women’s age on treatment outcome has been reported since 2006. In 2007, the pregnancy rates per initiated IVF cycle decreased from 34.0% in women aged less than 35 years, to 13.9% in those aged 40 years or more (Supplementary data, Table SXVIII). Similar trends were noted for ICSI (from 33.3 to 12.2%, Supplementary data, Table SIX) and FER (from 21.7 to 14.4%, Supplementary data, Tables SX), but not for ED (Supplementary data, Table SXI). These supplementary tables also provide delivery rates per cycle. It is important to consider these tables since they better allow comparing the countries, as age is a major prognostic factor that is unequally distributed across the countries.

With the noticeable decline in the number of embryos transferred, the cumulative delivery rate per started cycle may be a most relevant end-point for ART (Supplementary data, Table SXVIII). In fact, the present method of calculation of this cumulative delivery rates is methodologically flawed because it represents the sum of fresh and FER pregnancies obtained in the same calendar year, rather than the FER pregnancies accruing from a single oocyte aspiration procedure. It should, however, be stressed that the precise figure, which can only be obtained a few years after the initial oocyte aspiration, is likely to be rather similar to our estimate. In several countries, the addition of FER deliveries contributed a substantial increase to the delivery rates per cycle: Finland (20.7–32.5%), Iceland (22.4–35.2%), Sweden (22.0–29.7%) and Switzerland (18.6–27.8%), justifying their transfer and freezing policies.

PGD/PGS activity was recorded from 14 countries, and included 4638 cycles resulting in 706 deliveries (15.2% per aspiration). Detailed analysis of PGD/PGS in Europe will be published separately by ESHRE’s PGD Consortium (Sermon et al., 2007).

The major differences between countries in terms of the provision of certain techniques, such as ED and PGD, must be viewed as markers of cross-border reproductive care where couples who do not have access to ART in their home countries, travel elsewhere for treatment. This phenomenon raises important public health concerns and underlines the need for more information in order to facilitate a detailed evaluation. This will be addressed by EIM in the coming year.

Regarding direct risks of ART, OHSS was recorded in 0.7% of cycles, at the same level as in 2006 (0.8%). However, there may be a degree of under-reporting, since the rate varies between 0.3 and 13% in the countries reporting OHSS.

For the sixth consecutive year, the present report includes European data on treatments with IUI-H (143,000 cycles) and IUI-D (26,000 cycles), thus showing an increase in IUI-H (+8000) and in IUI-D (+2000), compared with 2006. The coverage of IUI activities by the national registers is less comprehensive than for the in vitro techniques. In women below 40 years of age the delivery rate was 10.2% for IUI-H and 14.6% for IUI-D.

After IUI (both partner and donor insemination), twin pregnancies were observed in approximately half as many cases when compared with IVF/ICSI but triplet rates were comparable.

In summary, the present 11th ESHRE report on ART for Europe in 2007 shows a continuing expansion of numbers of participating clinics, countries and treatment cycles reported. The rise in the use of ICSI continued and reached 68.0% in 2007. Delivery rates after IVF and ICSI increased marginally in comparison with figures from 2006, with minor differences in the number of embryos transferred per cycle and rates of multiple birth.

Supplementary data
Supplementary data are available at http://humrep.oxfordjournals.org/.

Authors’ roles
V.G. and J.M. made the calculations. J.M. wrote the paper. All other co-authors reviewed the document and made appropriate corrections and suggestions for improving the document. Finally, this document represents a really collaborative work.

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Conflict of interest
None declared.
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Appendix

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