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Comparison of IVF cycles reported in a voluntary ART registry with a mandatory registry in Spain

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BACKGROUND: Monitoring assisted reproductive technology (ART) is essential to evaluate the performance of fertility treatment and its impact on birth rates. In Europe, there are two kinds of ART registers: voluntary and mandatory. The validity of register data is very important with respect to the quality of register-based observational studies. The aim of this paper is to determine the degree of agreement between voluntary and mandatory ART registers.

METHODS: The two sources for the data compared in this study (referring to 2005 and 2006) were FIVCAT.NET (an official compulsory Assisted Reproduction Registry within the Health Ministry of the Regional Government of Catalonia, to which all authorized clinics, both public and private, performing assisted reproduction in the region are obliged to report) and the register of the Spanish Fertility Society (SEF), to which data are provided on a voluntary basis. The SEF register data were divided into two groups: (i) data from clinics in Catalonia (SEF-CAT); (ii) data from the rest of Spain, excluding Catalonia (SEF-wCAT). The techniques compared were IVF cycle using patients' own eggs (IVF cycle) versus donor egg cycles.

RESULTS: For IVF cycles, the voluntary ART register reflected 77.2% of those on the official one, but the corresponding figure was only 34.4% with respect to donated eggs. The variables analysed in the IVF cycle (insemination technique used, patients' age, number of embryos transferred, pregnancy rates, multiple pregnancies and deliveries) were similar in the three groups studied. However, we observed significant differences in donor egg cycles with regard to the insemination technique used, pregnancy rates and multiple pregnancies between the voluntary and the official register.

CONCLUSIONS: Data from the voluntary ART register for IVF cycles are valid, but those for donor egg cycles are not. Further study is necessary to determine the reasons for this difference.

Key words: IVF / data registers / success rates / donor egg / Spain

Introduction

The principal aim of an assisted reproductive technology (ART) register is to describe the quantity and quality of ART. The validity of register data is very important, because register-based observational studies are usually the only feasible study type for assessing the performance and impact of fertility treatment on birth rates (Nyboe Andersen and Erb, 2006). Whether the focus of the study is the use (insemination technique, day of transfer, etc.), the quality (number of embryos transferred) or the safety (multiple pregnancy) of ART, the quality of study findings is entirely dependent on the quality of the original data.

The ART national register can be classified according to different criteria: (i) by organizers—a national health authority, a national

© The Author 2010. Published by Oxford University Press on behalf of the European Society of Human Reproduction and Embryology. All rights reserved. For Permissions, please email: journals.permissions@oxfordjournals.org professional organization or health care insurance; (ii) by data collection systems—detailed, online, cycle-by-cycle, registration data or a summary by type of ART treatment on a yearly basis; (iii) by data validation—under a mandatory system, whether or not legally regulated—or without validation; (iv) by involvement: mandatory or voluntary. A voluntary register may present total coverage (e.g. Canada; Gunby *et al.*, 2010), or partial coverage (e.g. Spain; Cabello *et al.*, 2009b). The validity of the latter type of register has been called into question, because when data declaration is voluntary, there may be a trend towards an over-estimation of good outcomes, since clinics that declare their data are often those that have a better clinical practice. If this were so, they would be over-represented in the register (Bosser *et al.*, 2009). One way to examine this possible bias is to compare data obtained from both voluntary and compulsory registers.

The Spanish region of Catalonia represents an unusual situation where the two kinds of registers can be compared. On the one hand, FIVCAT.NET is the official assisted reproduction register of the Health Ministry of the Regional Government of Catalonia, to which all clinics, both public and private, performing assisted reproduction in the region are obliged to report all their cycles (Bosser *et al.*, 2009). On the other hand, the register of the Spanish Fertility Society (SEF) receives data from assisted reproduction clinics throughout Spain, including Catalonia, provided on a voluntary and anonymous basis (Cabello *et al.*, 2009b).

Various aspects (financial, religious, cultural, legislative, demographic, etc.) must be taken into account in any analysis of the availability and outcome of ART in different countries (Navarro *et al.*, 2008). One such aspect is the existence or otherwise of an official, compulsory ART register. However, analysing the impact on ART of this question is very difficult because national ART legislation varies considerably between countries (Ziebe and Devroey, 2008). A comparison of the results reported to FIVCAT.NET for Catalonia and to the SEF register for the rest of Spain (where no official register exists) would enable us to determine the influence on ART of the presence or absence of an official register under a common legal framework.

Accordingly, the aim of this study was to evaluate the accuracy of a voluntary register (SEF) and to analyse the relationship between an official register and ART treatments.

Materials and Methods

This study constitutes a retrospective data-exploratory analysis of activity registers concerning assisted reproduction clinics in Spain. The two sources for the data used in this study were the FIVCAT.NET (Bosser et al., 2009) and the SEF registers for the years 2005 and 2006 (Marqueta et al., 2008; Cabello et al., 2009a). The data from the SEF register were divided into two groups: (i) data from clinics in Catalonia (SEF-CAT); (ii) data from the rest of Spain (SEF-wCAT).

FIVCAT.NET collects data cycle-by-cycle, and is an administrative register for the purpose, among others, of determining patients' medication costs and reimbursements. All cycles performed in Catalonia must be registered on FIVCAT.NET. Compliance with this obligation is ensured by a programme of inspections by the competent healthcare authorities. The costs of certain cycles are not reimbursed (those for the fourth and subsequent cycles for the same couple, and those provided to foreign patients). The SEF register receives data from assisted reproduction clinics throughout Spain, provided on a voluntary and anonymous basis. Data are collected centre-by-centre. No class of inspection of the SEF register is made.

The techniques compared were IVF cycles using patients' own eggs (hereafter referred to as 'IVF cycle') versus donor egg cycles. The definitions established by the International Committee Monitoring Assisted Reproductive Technologies (ICMART) are followed by both registers (Zegers-Hochschild *et al.*, 2009). Comparison of frozen embryo cycles was not possible because the FIVCAT.NET and SEF registers have different recording systems, making them incompatible for a study of such cycles.

The variables analysed were grouped into the following categories: (i) characteristics of the clinic—the level of activity and range of services offered; (ii) clinical parameters—the age of the women treated and the treatment method adopted; (iii) effectiveness—pregnancy rates; (iv) quality—the number of embryos transferred; (5) safety and risks—multiple pregnancies and deliveries.

For the statistical analysis of the results, we carried out a bivariate analysis to determine the differences among the study groups, using the χ^2 test. In all cases, a level of significance of 5% was applied.

Results

The voluntary SEF register registered 61.7% of the cycles recorded by the official FIVCAT.NET register. The distribution of clinics according to the number of cycles provided was similar in FIVCAT.NET and SEF-wCAT. Regarding their level of activity, the ART clinics that did not provide voluntary reports to the SEF register in Catalonia mainly performed 50–500 transfers per year (Table I).

IVF cycles

For IVF cycles, the SEF-CAT register accounted for 77.2% of all the cycles included in the FIVCAT.NET register. The use of IVF, ICSI and IVF + ICSI, together with the age distribution of the patients reported by FIVCAT.NET, SEF-CAT and SEF-wCAT were all similar (Table II).

The number of embryos transferred in IVF cycles is similar in the FIVCAT.NET and SEF-CAT registers, and in turn, this value coincides with that corresponding to the rest of Spain (Table III).

The rate of pregnancies per transfer is similar in the different registers analysed: 37.3% in FIVCAT.NET, 38.1% in SEF-CAT and 38.5% in SEF-wCAT. Moreover, the rate of multiple pregnancy is also similar in

Table I Size of the ART clinics reporting to theFIVCAT.NET and SEF registers in 2005 and 2006.

| | FIVCAT.NET | SEF-CAT | SEF-wCAT |
|-----------------------------|------------|----------|----------|
| <50 transfers, <i>n</i> (%) | (18.9) | 9(27.3) | 34(19.7) |
| 50–500 transfers, n (%) | 36(62.1) | 14(42.4) | 99(57.2) |
| >500 transfers, n (%) | (19) | 10(30.3) | 39(22.5) |
| All | 58 | 34 | 173 |

FIVCAT.NET, official compulsory Assisted Reproduction Registry within the Health Ministry of the Regional Government of Catalonia; Spanish Fertility Society (SEF), data from clinics in Catalonia (SEF-CAT); data from the rest of Spain, excluding Catalonia (SEF-wCAT).

| | IVF cycles | | | Donor egg | | |
|-------------------|------------|------------|---------------|------------|------------|-------------------------|
| | FIVCAT.NET | SEF-CAT | SEF-wCAT | FIVCAT.NET | SEF-CAT | SEF-wCAT |
| No. of cycles | 10 398 | 8026 | 48 346 | 5923 | 2036 | 10 797 |
| IVF, n (%) | 1507(14.5) | 1464(18.2) | 6822(14.1) | 894(15.1) | 622(30.6) | 2056(19.0) ^a |
| ICSI, n (%) | 7120(68.5) | 5162(64.3) | 37 18(76.8) | 4665(78.8) | 1137(55.8) | 7907(73.2) |
| IVF + ICSI, n (%) | 1771(17.0) | 1400(17.4) | 4406(9.1) | 364(6.1) | 277(13.6) | 834(7.7) |
| Patient age (yrs) | 10398 | 8495 | 48222 | 5923 | 1931 | 10748 |
| <30, n (%) | 1058(10.2) | 707(8.3) | 4367(9.1) | 163(2.8) | 48(2.5) | 220(2.0) |
| 30–34, n (%) | 3882(37.3) | 3057(36.0) | 18010(37.3) | 653(11.0) | 200(10.4) | 1444(13.4) |
| 35–39, n (%) | 4004(38.5) | 3351(39.4) | 20296(42.1) | 1508(25.5) | 515(26.7) | 3185(29.7) |
| 40–44, n (%) | 1367(13.2) | 1297(15.3) | 5197(10.8) | 2544(42.9) | 736(38.0) | 4153(38.7) |
| >44, n (%) | 87(0.8) | 83(1.0) | 352(0.7) | 1055(17.8) | 432(22.4) | 1746(16.2) |

Table II Comparison between FIVCAT.NET, SEF-CAT and SEF-wCAT in IVF and donor egg cycles in 2005 and 2006.

 $^{a}P < 0.001$ for insemination technique in donor egg cycles.

Table III Transfers, pregnancies and deliveries in FIVCAT.NET, SEF-CAT and SEF-wCAT in IVF and donor egg cycles in 2005 and 2006.

| | IVF cycles | | | Donor egg | | |
|---|------------|-------------|--------------|------------|------------|-------------------------|
| | FIVCAT.NET | SEF-CAT | SEF-wCAT | FIVCAT.NET | SEF-CAT | SEF-wCAT |
| No. of transfers | 9969 | 7647 | 38 970 | 5614 | 1928 | 9936 |
| l embryo, <i>n</i> (%) | 1460(14.6) | 1090(14.3) | 5691(14.6) | 484(8.6) | 66(3.4) | 619(6.2) |
| 2 embryos, <i>n</i> (%) | 5369(53.9) | 4341 (56.8) | 22 145(56.8) | 4191(74.7) | 1503(78.0) | 7426(74.8) |
| 3 embryos, <i>n</i> (%) | 3140(31.5) | 2216(29.0) | 34(28.6) | 939(16.7) | 359(18.6) | 1891(19.0) |
| No. of pregnancies, <i>n</i> (% per transfer) | 3281(37.3) | 2773(38.1) | 14 267(38.5) | 2312(44.1) | 954(53.3) | 4767(49.9) ^a |
| Singleton, n (%) | 2625(80.0) | 2135(77.0) | 10 569(74.1) | 1835(79.4) | 636(66.7) | 3352(70.3) ^b |
| Multiple, n (%) | 656(20.0) | 638(23.0) | 3698(25.9) | 477(20.6) | 318(33.3) | 1415(29.7) |
| Twin, <i>n</i> (%) | 614(18.7) | 601(21.7) | 3458(24.2) | 454(19.6) | 301(31.6) | 1348(28.3) |
| Triplets, n (%) | 42(1.3) | 37(1.3) | 240(1.7) | 23(1.0) | 17(1.8) | 67(1.4) |
| No. of deliveries | 2517 | 1688 | 6967 | 1781 | 480 | 2651 |
| Singleton, n (%) | 1919(76.2) | 1318(78.1) | 5141(73.8) | 1352(75.9) | 346(72.1) | 1907(71.9) |
| Multiple, n (%) | 598(23.8) | 370(21.9) | 1826(26.2) | 429(24.1) | 134(27.9) | 744(28.1) |
| Twin, <i>n</i> (%) | 571(22.7) | 350(20.7) | 1724(24.7) | 414(23.2) | 130(27.1) | 734(27.7) |
| Triplets, n (%) | 27(1.1) | 20(1.2) | 102(1.5) | 15(0.8) | 4(0.8) | 10(0.4) |

 $^{a}P < 0.001$ for % pregnancies per transfer in donor egg cycles; $^{b}P < 0.001$ for type of pregnancies in donor egg cycles.

the three registers examined (20% in FIVCAT.NET, 23% in SEF-CAT and 25.9% in SEF-wCAT). Nor are there significant differences with respect to the rate of twin and triplet pregnancies, or in the percentage of multiple births reported in each register (Table III).

Egg donor cycles

For cycles with donated eggs, the SEF-CAT register contained 34.4% of the number of cycles reported on the FIVCAT.NET register. The use of IVF, ICSI and IVF + ICSI in Catalonia varies between the two corresponding registers (FIVCAT.NET and SEF-CAT), and the difference is statistically significant (15.1 versus 30.6%; P < 0.05 for IVF cycles; 78.8 versus 55.8%; P < 0.05 for ICSI cycles; and 6.1 versus 13.6%; P < 0.05 for IVF + ICSI cycles). Furthermore, the differences

are also significant on comparison of the FIVCAT.NET cycles with those for the rest of Spain (30.6 versus 19%; P < 0.001 in IVF cycles; 55.8 versus 73.2%; P < 0.001 in ICSI cycles; and 13.6 versus 7.7%; P < 0.001 in IVF + ICSI cycles; Table II).

The age distribution of the patients registered in FIVCAT.NET is similar to that for SEF-CAT, and to that found for the rest of Spain.

The rate of single-embryo transfers in cycles with donated eggs, as reported to FIVCAT.NET, was different from that of the SEF-CAT register and also from that for the rest of Spain, although this difference was not significant (8.6 versus 3.4 versus 6.2%, respectively; Table III).

The rates of pregnancy per transfer also varied among the different registers analysed. Thus, for FIVCAT.NET and SEF-CAT, the respective values were 44.1 versus 55.3%; P < 0.001; and for FIVCAT.NET

and SEF-wCAT, they were 44.1 versus 49.9%; P < 0.001. The difference between SEF-CAT and SEF-wCAT was not statistically significant.

The rate of multiple pregnancy, too, was different among the three registers. For FIVCAT.NET and SEF-CAT, the respective values were 20.6 versus 33.3%; P < 0.001. For the rest of Spain, the rate of multiple pregnancy reported was 29.7%, and so this, too, differed significantly from the other two registers.

The rates of multiple birth reported by the three registers were different, but the difference was not significant (24.1% in FIVCAT.NET, 27.9% in SEF-CAT and 28.1% in SEF-wCAT).

Discussion

At an EU-wide level, the European IVF-monitoring (EIM) consortium compiles information that clinics declare, voluntarily or otherwise, on ART cycles (Nyboe Andersen et al., 2009). In Spain, although calls have been made for the implementation of an official ART register, this has only been put into practice in the region of Catalonia, and the only national one is the voluntary SEF register. We compare these two sources of information, voluntary and official, to shed light on the validity of ART register-based data. To the best of our knowledge, this is one of the first such studies performed. A striking result is that only 61.7% of the ART cycles reported to the official FIVCAT.NET register are reflected in SEF-CAT. Several factors could account for this low percentage. Firstly, clinics might not be interested in sending data to a voluntary register because they have already transmitted them to the official one. Secondly, clinics that decline to participate voluntarily might take this attitude in the belief that the SEF register lacks validity, because it compiles summarized data centre-by-centre instead of detailed data cycle-by-cycle as is done by FIVCAT.NET. In our opinion, if this were the case, the percentage of non-SEF-registered cycles would be similar for both types of procedure (IVF and donor egg cycles). However, we found differences in the percentages of cycles registered: for IVF cycles, the SEF rate was 77.2%, while for donor egg cycles, it was 34.4%.

Our results show that the clinics which do not voluntarily contribute to an ART register are those which carry out a high number of donor egg cycles. Therefore, there must be reasons other than those described above to account for our data. Firstly, there might be some difference in the characteristics of the patients treated at these clinics that would persuade the clinics not to supply the data voluntarily; for example, their nationality. In Catalonia, in 2005, 26.2% of the patients treated were residents of other countries (Bosser et al., 2009). In countries with a similar proportion of crossborder reproductive care, most patients travel in order to receive egg donation (Pennings et al., 2008). Secondly, there could be differences in clinical practice among the clinics that lead them not to participate voluntarily. In this sense, our data show that the number of embryos transferred, and the rates of pregnancy and multiple pregnancy are similar for IVF cycles in SEF-CAT and FIVCAT.NET. However, the data reported to FIVCAT.NET regarding donor egg cycles reflect a tendency to transfer fewer embryos (single embryo transfer 8.6 versus 3.4%, respectively), and therefore a significantly lower percentage of pregnancies per transfer (44.1 versus 53.3%) and of multiple pregnancies (20.6 versus 33.3%) is achieved. A possible explanation for these findings is that the clinics which do not participate voluntarily in the SEF-CAT register may have pro-active

policies for single embryo transfer; alternatively, these clinics may assign a certain number of donor eggs per recipient, and so there would be fewer embryos available for transfer, and thus a lower rate of pregnancies per transfer and of multiple pregnancies. As noted previously (Materials and Methods), the systems for registering cryotransfers are different in the SEF and FIVCAT.NET registers, and mutually incompatible; accordingly, these hypotheses cannot be analysed by comparing the cryotransfer cycles on each register.

After adjusting the 2005 SEF data reported to the EIM (Nyboe Andersen et al., 2009) for the percentage of non-registered cycles observed in the present study, we calculate that in Spain, in 2005, a total of 37 279 IVF cycles and 17 279 donor egg cycles were performed, which would make Spain the third-ranking country in Europe (after France and Germany) for IVF cycles, and first for donor egg cycles, at 11.2 and 75.5% of the IVF and donor egg cycles, respectively, performed in Europe (Nyboe Andersen et al., 2009). Moreover, if we apply the percentage of foreign residents using assisted reproduction services in Catalonia (commented above) to this figure and take into account that in countries with a similar percentage when egg donation is considered separately, 60% of all recipients are foreigners (College of Physicians 'Reproductive Medicine' and the Belgian Register for Assisted Procreation, 2001), this might constitute the first serious estimation of cross-border reproductive care in Spain, showing that around 4000 IVF and 10 000 donor egg cycles for this population are carried out in Spain each year. This would place Spain as the leading country in Europe with respect to the absolute number of cycles carried out for foreign residents (Pennings, 2004).

The lower percentage of deliveries per clinical pregnancy observed in the SEF register (58.2%) versus FIVCAT.NET (76.8%) suggests that losses to follow-up are higher in the voluntary than in the official ART register. We reject the hypothesis that the clinics participating in a voluntary register have less strict respect for the definitions of clinical pregnancy, and in some cases may have included chemical pregnancies as clinical ones, because the rate of pregnancies per transfer was similar in IVF cycles in both registers. In agreement with Nygren (2004), we believe that pregnancy rates are more reliable and more valid than delivery rates because each clinic has direct information on pregnancies, whereas the deliveries corresponding to some clinics may suffer a high proportion of losses to follow-up. Therefore, before using data on delivery outcomes obtained from ART registers (official or voluntary), whenever possible these should be cross-linked to other national registers (deliveries, malformations, etc.), which are available.

The results obtained by the SEF register for the rest of Spain (i.e. excluding Catalonia) for IVF cycles are similar to those found for Catalonia by both FIVCAT.NET and SEF-CAT, and so we consider the evidence of the SEF register for this type of cycle to be valid. Therefore, we reject the hypothesis of Bosser *et al.* (2009) that when data declaration is voluntary, there may be a tendency to overestimate good outcomes. The voluntary involvement of Spanish clinics in the SEF register is a reflection of the honest commitment to the SEF register by members of the IVF Directors group and of the dedication of their staff.

Different strategies may be employed to increase the participation rate in a voluntary register. Firstly, its successful implementation requires more intervention than simple distribution or (electronic) publication, and may involve methods such as educational meetings, local consensus processes and the employment of local opinion leaders. Secondly, financial compensation or advantage may be given to participating clinics, as is the case with the official FIVAT.NET register in Catalonia, whereby the costs of most cycles registered are reimbursed. Nevertheless, this particular action is not possible for a professionally controlled observational register such as SEF. Thirdly, in the specific situation of Spain, the official and voluntary data may be processed jointly. However, this measure would oblige analysts to combine data obtained from different sources (compulsory, detailed data cycle-by-cycle together with voluntary, summarized data centre-by-centre). In other registers where such a situation occurs, data from different origins are not mixed (Gunby *et al.*, 2009).

Finally, the usefulness of the register for both clinics and patients could be increased by publishing the data and results received from participating clinics. This measure has been the subject of considerable discussion (Nygren, 2004; Belaisch-Allart, 2006; Pouly, 2006; Bouyer and Olivennes, 2006), and it is currently applied in some countries, including the USA (http://www.cdc.gov/ART/ART2006/index.htm) and the UK (http://guide.hfea.gov.uk/guide). Together with other authors (Haan et al., 1991; Marshall and Spiegelhalter, 1998; Castilla et al., 2008) we have suggested previously that IVF clinic ranking should be avoided, because differences between IVF clinics are dependent on the classification methods used and may not reflect the real performance achieved. Lintsen et al. (2010) showed that only 17% of the differences in pregnancy rates among IVF centres are explained by patient mix, suggesting that other factors, such as lifestyles, should also be taken into account. In this respect, in an earlier study, we highlighted the importance of healthcare coverage for infertility treatment (Castilla et al., 2009). The above-mentioned strategies for increasing the usefulness of registers should be accompanied by some kind of validation of the data reported by clinics, for example in the form of auditing and feedback response. Such a measure has been adopted by the SEF register to be applied in forthcoming years (http:// registrosef.wordpress.com).

Although several sources of uncertainty remain, such as data on donor egg cycles, it can be concluded that voluntary ART register-based information is, at the least, a satisfactory source for estimating the use of IVF cycles and clinical practice in this respect. The generalization of our results to include other aspects of ART (cryopreserved embryos, preimplantation genetic diagnosis, *in vitro* maturation, etc.) is an open question. With respect to validation of the register, it is important to achieve and maintain excellent quality regarding the data recorded.

Authors' roles

All authors contributed to the study design. F.L. led the study, together with J.L.G.-P, Y.C. and J.A.C.; B.C, J.H. and J.M contributed to analysis and interpretation of data. J.H., E.V. and S.F.-S. supervised the study. All authors contributed to the drafting, revision and final approval of the manuscript.

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References

Belaisch-Allart J. Transparence des résultats en Assitance médicale à la procréation: oui, mais. *Gynecol Obstet Fertil* 2006;**34**:430–431.

- Bosser R, Gispert R, Torné M, Calaf J. Status of human assisted reproduction in Spain: results from the new registry of Catalonia. *Reprod Biomed Online* 2009;**19**:727–733.
- Bouyer J, Olivennes F. Transparence des résultats en Assistance médicale à la procréation: une collaboration nécessaire entre cliniciens et épidémiologistes. *Gynecol Obstet Fertil* 2006;**34**:681–682.
- Cabello Y, Gómez JL, Castilla JA, Marqueta J, Hernández J, Coroleu B. Registro FIV-ICSI de la Sociedad Española de Fertilidad. Año 2006. *Rev Iberoam Fertil* 2009a;**26**:13–36.
- Cabello Y, Gómez JL, Castilla JA, Hernández J, Marqueta J, Vidal E, Fernández-Shaw S, Herrero J, Luceño F, Coroleu B. Registro FIV–ICSI de la Sociedad Española de Fertilidad. Año 2007. *Rev Iberoam Fertil* 2009b;**26**:9–33.
- Castilla JA, Hernández J, Cabello Y, Lafuente A, Pajuelo N, Marqueta J, Coroleu B. Assisted Reproductive Technology Register of the Spanish Fertility Society. Defining poor and optimum performance in an IVF programme. *Hum Reprod* 2008;**23**:85–90.
- Castilla JA, Hernández E, Cabello Y, Navarro JL, Hernández J, Gómez JL, Pajuelo N, Marqueta J, Coroleu B. Assisted reproductive technologies in public and private clinics. *Reprod Biomed Online* 2009;**19**:872–878.
- College of Physicians 'Reproductive Medicine' and Belgian Register for Assisted Procreation. Brussels: Verslag 1998–1999, 2001.
- Gunby J, Bisonette F, Librech C, Cowan L. Assisted reproductive technologies in Canada: 2005 results from the Canadian Assisted Reproductive Technologies Register. *Fertil Steril* 2009a;**91**:1721-1730.
- Gunby J, Bisonette F, Librech C, Cowan L. Assisted reproductive technologies (ART) in Canada: 2006 results from the Canadian ART Register. *Fertil Steril* 2010;**93**:2189–2201.
- Haan G, Bernardus RE, Hollanders JM, Leerentveld RA, Prak FM, Naaktgeboren N. Results of IVF from a prospective multicentre study. *Hum Reprod* 1991;**6**:805–810.
- Lintsen A, Braat D, Habbema J, Kremer J, Eijkemans M. Can differences in IVF success rates between centres be explained by patient characteristics and sample size? *Hum Reprod* 2010;**25**:110–117.
- Marqueta J, Hernández J, Cabello Y, Gómez JL, Buenaventura C, Castilla JA. Registro SEF FIV/ICSI 2005. *Rev Iberoam Fertil* 2008;**25**:5–29.
- Marshall EC, Spiegelhalter DJ. Reliability of league tables of in vitro fertilisation clinics: retrospective analysis of live birth rates. *Br Med J* 1998;**316**:1701–1704.
- Navarro JI, Castilla JA, Martínez L, Hernández E. Coverage and current practice patterns regarding assisted reproduction techniques. *Eur J Obstet Gyn Reprod Biol* 2008;**138**:3–9.
- Nyboe Andersen A, Erb K. Register data on assisted reproductive technology (ART) in Europe including a detailed description of ART in Denmark. *Int J Androl* 2006;**29**:12–16.
- Nyboe Andersen A, Goosens V, Bhattacharya S, Ferraretti M, Kupka MS, de Mouzon J, Nygren KG, The European IVF-monitoring (EIM) Consortium, for the European Society of Human Reproduction and Embryology (ESHRE). Assisted reproductive technology and

intrauterine inseminations in Europe, 2005: results generated from European registers by ESHRE. Hum Reprod 2009; I:1–21.

- Nygren K. Setting up an ART national register. In: Gardner DK, Weissman A, Holwes C, Shoham Z (eds). *Textbook of Assisted Reproductive Techniques: Laboratory and Clinical Perspectives*, 2nd edn. London: Martin Dunitz Press, 2004.
- Pennings G. Legal harmonization and reproductive tourism in Europe. *Hum Reprod* 2004; **19**:2689–2694.
- Pennings G, de Wert G, Shenfield F, Cohen J, Tarlatzis B, Devroy P. Eshre task force on ethics and law 15: cross-border reproductive care. *Hum Reprod* 2008;**23**:2182–2184.
- Pouly JL. Transparence des résultats en Assistance médicale à la procréation: oui, mais. *Gynecol Obstet Fertil* 2006;**34**:432–433.
- Zegers-Hochschild F, Adamson GD, De Mouzon J, Ishihara O, Mansour R, Nygren K, Sullivan E, Van der Poel S. The International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) revised glossary on ART terminology, 2009. *Hum Reprod* 2009;**24**: 2683–2687.
- Ziebe S, Devroey P. Assisted reproductive technologies are an integrated part of national strategies addressing demographic and reproductive challenges. *Hum Reprod Update* 2008;11:583–592.

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