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Assisted reproductive technology in Europe, 2013: results generated from European registers by ESHRE†

The European IVF-monitoring Consortium (EIM)‡ for the European Society of Human Reproduction and Embryology (ESHRE)

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STUDY QUESTION: Are there any changes in the treatments involving ART and IUI initiated in Europe during 2013 compared with previous years?

SUMMARY ANSWER: An increase in the overall number of ART cycles resulting from a higher number of countries reporting data was evident, the pregnancy rates (PRs) in 2013 remained stable compared with those reported in 2012, the number of transfers with multiple embryos (3+) was lower than ever before yet the multiple delivery rates (DRs) remained unchanged, and IUI activity and success rates were similar to those of last years.

WHAT IS KNOWN ALREADY: Since 1997, ART data in Europe have been collected and reported in 16 manuscripts, published in *Human Reproduction*.

STUDY DESIGN, SIZE, DURATION: Retrospective data collection of European ART data by the European IVF-monitoring Consortium for ESHRE. Data for cycles between 1 January and 31 December 2013 were collected from National Registers, when existing, or on a voluntary basis by personal information.

PARTICIPANTS/MATERIALS, SETTINGS, METHODS: From 38 countries (+4 compared with 2012), 1169 clinics reported 686 271 treatment cycles including 144 299 of IVF, 330 367 of ICSI, 154 712 of frozen embryo replacement (FER), 40 244 of egg donation (ED), 247 of IVM, 9791 of PGD/PGS and 6611 of frozen oocyte replacements. European data on intrauterine insemination using husband/partner's semen (IUI-H) and donor semen (IUI-D) were reported from 1095 IUI labs in 22 countries. A total of 175 467 IUI-H and 43 785 IUI-D cycles were included.

MAIN RESULTS AND THE ROLE OF CHANCE: In 17 countries where all clinics reported to their ART register, a total of 374 177 ART cycles were performed in a population of around 310 million inhabitants, corresponding to 1175 cycles per million inhabitants (range, 235–2703 cycles per million inhabitants).

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‡EIM Committee 2013–2015: chairman: C.C-J.; chairman elect: C.D.; past chairman: M.K. members: J.d.M., K.E., E.M., T.M., G.S., C.W. and V.G. is a science manager at ESHRE Central Office, Brussels. See also Appendix for contributing centres and contact persons representing the data collection programmes in the participating European countries.
The main results of this report were presented at the annual ESHRE congress in Helsinki, July 2016.

For all IVF cycles, the clinical PRs per aspiration and per transfer were stable with 29.6% (29.4% in 2012) and 34.5% (33.8% in 2012), respectively. For ICSI, the corresponding rates also were stable with 27.8% (27.8% in 2012) and 32.9% (32.3% in 2012). In FER-cycles, the PR per thawing/warming increased to 27.0% (23.1% in 2012). In ED cycles, the PR per fresh transfer increased to 49.8% (48.4% in 2012), to 38.5% (35.9% in 2012) per thawed transfer, and to 46.4% for transfers after FOR (45.1% in 2012). The DRs after IUI remained stable at 8.6% (8.5% in 2012) after IUI-H and was slightly lower after IUI-D (11.1% versus 12.0% in 2012).

In IVF and ICSI cycles, 1, 2, 3 and 4+ embryos were transferred in 31.4, 56.3, 11.5, and 1.0% of the cycles, respectively (corresponding numbers were 30.2, 55.4, 13.3 and 1.1% in 2012). The proportions of singleton, twin and triplet deliveries after IVF and ICSI (added together) were 82., 17.5 and 0.5%, respectively, resulting in a total multiple DR of 18.0% compared to 17.9% in 2012. In FER-cycles, the multiple DR was 12.8% (12.5% twins and 0.3% triplets), nearly the same as in 2012 (12.5, 12.2 and 0.3% respectively).

Twin and triplet DRs associated with IUI cycles were 9.5%/0.6% and 7.5%/0.3%, following treatment with husband/donor semen, respectively.

LIMITATIONS, REASONS FOR CAUTION: The method of reporting varies among countries, and registers from a number of countries have been unable to provide some of the relevant data such as initiated cycles and deliveries. As long as data are incomplete and generated through different methods of collection, the results should be interpreted with caution.

WIDER IMPLICATIONS OF THE FINDINGS: The 17th ESHRE report on ART shows a continuing expansion of the number of treatment cycles in Europe, with more than 685 000 cycles reported in 2013 and an increasing contribution to birth rate in many countries. However, the need to improve and standardize the national registries, and to establish validation methodologies, remains manifest.

STUDY FUNDING/COMPETING INTEREST(S): The study has no external funding; all costs are covered by ESHRE. There are no competing interests.

Key words: IVF / ICSI / IUI using husband/partner's semen / IUI using donor semen / egg donation / frozen embryo replacement / insemination / Europe / register / registry

Introduction

This report is the 17th annual publication of the European IVF-monitoring Consortium (EIM) under the umbrella of ESHRE on European data on ART.

The 16 previous reports, also published in *Human Reproduction* (https://www.eshre.eu/Data-collection-and-research/Consortia/EIM/Publications.aspx), covered treatment cycles from 1997 to 2012. As in the last reports, the printed version contains the four most significant tables. In addition, a total of 19 supplementary tables are available online, making this report consistent with those published in previous years.

Materials and Methods

Data on ART were collected in 38 European countries, covering IVF, ICSI, frozen embryo replacement (FER), egg donation (ED), IVM, pooled data on PGD and PGS as well as frozen oocyte replacements (FORs). In addition, data on IUI using husband/partner's semen (IUI-H) and donor semen (IUI-D) were also included. The report includes treatments started between 1 January 2013 and 31 December 2013. Data on pregnancy outcomes are derived from follow-up of the cohort treated during this time period.

For 2013 collection of data, the same questionnaire forms with six modules used in the four previous years were made available to the data collection co-ordinator of each participating country. Data collected were directly entered in an online ESHRE computer system (specifically designed) that informed each user of inconsistencies and possible mistakes of insertion, and performed all calculations automatically. V.G. in ESHRE's central office provided close supervision of the whole new process and checked every detail. The system proved to be very robust.

The method of reporting data was similar to that used in the previous years, making results comparable. As usual, footnotes of tables inform on details of the diversity of data reported by individual countries when applicable.

Definitions used refer to The International Committee for Monitoring Assisted Reproductive Technology (ICMART) and World Health Organization glossary of ART terminology (Zegers-Hochschild *et al.*, 2009).

Results

As is evident from the tables, the only complete data reported by all countries remained the number of aspirations and the number of centres performing ART. Few registers have been able to provide reliable data on initiated cycles and some countries did not report deliveries; in addition, several countries show a high percentage of pregnancies that were lost to follow-up. Therefore, complete outcome data were only available on the clinical pregnancy rate (PR) per aspiration, while some relevant indicators of treatment success (clinical pregnancies and deliveries per initiated cycle) could not be reported completely, and consequently comparison of countries should be performed with caution. Due to the diversity of some of the data reported from the different countries, footnotes in the tables deserve particular attention for data interpretation.

Participation

The present report includes data from 38 of 51 European countries (Supplementary Table SI).

Cyprus, Latvia and Macedonia resumed their participation. Malta participated for the first time. Former contributors Bosnia and Turkey were not able to participate this year. Slovakia has never contributed to data collection. The largest contributors in 2013 were France (total number of treatments, excluding IUI—84 214), Spain (78 152), Germany (76 422), Russia (67 861), Italy (64 446) and the UK (61 728).

The proportion of ART clinics reporting data was 85.4% (82.1% in 2012) (Table I). In 17 countries (18 in 2012), the coverage reached

Table I Treatment frequencies after ART in European countries in 2013.

Country	IVF clinics in the country				Treatment cycles								Cycles/million*	
	IVF Clinics	Included IVF clinics	IUI labs	Included IUI labs	IVF	ICSI	FER	PGD	ED	IVM	FOR	All	Women 15–45 years	Population
Albania	9	1	9	1	0	91	32	0	16	0	0	139		
Austria	28	27			916	4905	1352					7173		
Belarus	4	3	7	3	1371	874	175	12	19	0	0	2451		
Belgium	18	18	34	29	3587	13 742	10 001	642	832		50	28 854	13 694	2585
Bulgaria	32	4	0	0	474	3712	890	24	280	0	0	5380		
Croatia	15	10	17	10	1878	2431	466				43	4818		
Cyprus	7	6			202	949	330	50	319			1850		
Czech Republic	41	41			1877	10 745	7208	1131	4357			25 318	11 764	2409
Denmark	21	21	62	60	6504	5080	3166	126	241	3	23	15 143	14 453	2703
Estonia	5	5	5	5	645	1179	884	0	178	0	1	2887	11 703	2187
Finland	19	19	25	25	2480	2081	3274	12	740	0		8587	8815	1575
France	101	101	192	192	21 205	39 136	22 133	628	994	118		84 214	6949	1280
Germany	131	130			12 531	43 435	20 456					76 422		
Greece	44	41	44	41	2395	9812	2024	410	3617	4	16	18 278		
Hungary	12	12			1267	4233	580		72			6152	3059	619
Iceland	1	1	1	1	222	173	260	0	134	0	0	789	11 927	2451
Ireland	7	3	8	3	678	517	371	0	0	0	0	1566		
Italy	203	203	369	369	7867	47 182	7428				1969	64 446	6327	1070
Kazakhstan	20	5			1576	1712	645	82	591	0	6	4612		
Latvia	4	2	4	2	109	332	124	2	107			674		
Lithuania	5	3	11	0	195	148	37	0	0	0	0	380		
Macedonia	5	4			305	1241	114		39			1699		
Malta	2	2	2	0		100	0	0	0	0	0	100	1247	235
Moldova	4	4	6	4	407	459	66	0	34			966	1207	271
Montenegro	4	3	3	3		453	22					475		
Norway	10	10	9	9	3048	2801	2318	0	0	2	0	8169	8170	1606
Poland	34	34		30	884	12 525	6151	259	896	56	197	20 968	2552	545
Portugal	26	26	27	27	2090	3505	1334	68	360	5		7362	3499	682
Romania	19	10	19	10	976	863	538	0	67	0	0	2444		
Russia	148	111			24 450	26 560	11 879	1084	3525	20	343	67 861		
Serbia	15	12	27		550	2170						2720		
Slovenia	3	3			1122	2549	1039	34	8	1	2	4755	12 404	2308
Spain	198	130	314	158	4522	34 069	14 255	3407	18 113	7	3779	78 152		
Sweden	17	15		0	5661	5950	6063	207	385			18 266		
Switzerland	28	26			852	4568	4134					9554		
The Netherlands	13	13			7131	8034	9361	425				24 951	7908	1503

Continued

Table I *Continued*

Country	IVF clinics in the country				Treatment cycles								Cycles/million*	
	IVF Clinics	Included IVF clinics	IUI labs	Included IUI labs	IVF	ICSI	FER	PGD	ED	IVM	FOR	All	Women 15–45 years	Population
Ukraine	38	32		11	2993	7978	3404	313	1280			15 968		
UK	78	78	102	102	21 329	24 073	12 198	875	3040	31	182	61 728	5063	971
All	1369	1169	1297	1095	144 299	330 367	154 712	9791	40 244	247	6611	686 271	6210	1175

ED, egg donation; FER, frozen embryo replacement; FOR, frozen oocyte replacement.
Treatment cycles in IVF and ICSI refer to initiated cycles.
IVF and ICSI: For Austria, Belgium, the Czech Republic, France, Iceland, Macedonia and Montenegro treatment cycles refer to aspirations.
For Belgium and the Czech Republic the total number of initiated cycles was only available for IVF and ICSI together, being 20 295 and 12 980, respectively.
Treatment cycles in FER refer to thawings.
FER: For the Czech Republic, Finland, France, Hungary, Lithuania, Macedonia, Moldova, Norway and the Netherlands treatment cycles refer to transfers.
Treatment cycles in PGD contain both fresh and frozen cycles and refer to initiated cycles in the fresh cycles and thawings in the frozen cycles.
PGD: For Finland and Iceland it refers to aspirations in the fresh cycles. For France and Greece it refers to aspirations in the fresh cycles and transfers in the frozen cycles.
PGD: For Sweden and The Netherlands it refers to transfers in the frozen cycles.
Treatment cycles in ED refer to donation cycles and contain fresh and frozen cycles.
ED fresh: For France, Iceland and Macedonia treatment cycles refer to aspirations. ED frozen: For Finland, France, Greece, Kazakhstan and Sweden treatment cycles refer to transfers.
Treatment cycles in IVM refer to aspirations.
Treatment cycles in FOR refer to thawings; for Finland it refers to transfers.
Women of reproductive age and population were found at the following link: http://www.census.gov/population/international/data/idb/region.php. http://www.census.gov/population/international/data/idb/informationGateway.php.

100% (Table I, Supplementary Table SIV). Among the countries with the largest populations, ART clinics participating in the registry were 100% in France, Italy, Poland and UK, 99% in Germany, 75% in Russia and only 66% in Spain.

Belarus, Cyprus, Germany, Macedonia and Montenegro were able to report data from all but a single centre each. Participation was lower than 20% in Albania (11%), and Bulgaria (13%).

Reporting methods and size of the clinics

Among the 17 countries where reporting was complete (Supplementary Tables SIII and SIV), the register was compulsory for 14 (12 held by a National Health Authority and 2 by a Medical Organization) and voluntary for three (two by a Medical Organization and one by personal initiative). Eight registers were based on individual forms, i.e. cycle-by-cycle data.

In the 21 countries with partial coverage, 15 registers were voluntary, 6 compulsory. Six were held by a National Health Authority, 12 by a Medical Organization and 3 by personal initiative; 8 used individual forms.

Sixteen countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Malta, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and UK) reported some kind of data validation process.

Public access to individual clinic data was available only in eight countries: Albania, Greece, Montenegro, Romania, Slovenia, Spain, The Netherlands and the UK.

Public (±industry or professional society) financial support for the national registration effort was present in 19 countries. In seven countries the centres covered part of the expenses, while in three countries (Albania, Macedonia, Montenegro) all the expenses were covered by the centres alone. This information is missing in nine countries

The distribution of clinics according to the number of cycles varied considerably among the countries (Supplementary Table SII). For instance, small clinics, providing <100 cycles annually, accounted for 2 out of 2 reporting centres in Malta, 2 of 3 in Lithuania and Montenegro, 2 of 4 in Moldova, 12 of 32 (37.5%) in Ukraine and 72 of 203 (35.5%) in Italy. In the other extreme, large clinics performing >1000 cycles a year constituted 10 out of 13 (76.9%) in The Netherlands, 13 of 18 (72%) in Belgium, 2 of 3 in Slovenia (66.7%) and 9 of 16 (60%) in Sweden.

Number of treatment cycles per technique and availability

In total, 686 271 cycles were reported in 2013 (Table I, Fig. 1), 46 127 more than in 2012 (+7.2%). Comparing the 34 countries which provided data in 2012 and 2013 consecutively, the amount of IVF + ICSI cycles increased from 452 578 to 471 428 (+4.2%).

Some variations were apparent in different countries. Considering the total number of techniques performed, in Greece 130% more cycles were registered in 2013 compared to 2012. Lithuania (+120%), Kazakhstan (+47%) and Croatia (+41%) also reported greatly increased number of cycles. On the other hand, 17 countries registered a lower activity in 2013, three of them reporting a decrease of more than 20% of the total number of cycles—Albania (−52%), Ireland (−45%) and Bulgaria (−25%).

Among the total of 474 666 fresh cycles reported in 2013, 144 299 were IVF (30.4%) and 330 367 were ICSI (69.6%) (Table I). The

year	countries	clinics	cycles	cycle-increase (%)	ART infants
1997	18	482	203,225		35,314 *
1998	18	521	232,225	+ 14.3	21,433 *
1999	21	537	249,624	+ 7.5	26,212 *
2000	22	569	275,187	+ 10.2	17,887 *
2001	23	579	289,690	+ 5.3	24,963 *
2002	25	631	324,238	+ 11.9	24,283*
2003	28	725	365,103	+ 12.6	68,931
2004	29	785	367,056	+ 0.5	67,973
2005	30	923	419,037	+ 14.2	72,184
2006	32	998	458,759	+ 9.5	87,705
2007	33	1029	493,420	+ 7.6	96,690
2008	36	1051	532,260	+ 7.9	107,383
2009	34	1005	537,463	+ 1.0	109,239
2010	31	991	550,296	+ 2.4	120,676
2011	33	1,314	609,973	+ 11.3	134,106
2012	34	1,354	640,144	+ 4.9	143,844
2013	38	1,169	686,271	+ 7.2	149,466
total			7 233,971		1 308,289

* Data only from countries reporting 100% coverage of ART activity

Figure 1 Number of clinics, cycles and ART infants in Europe 1997–2013.

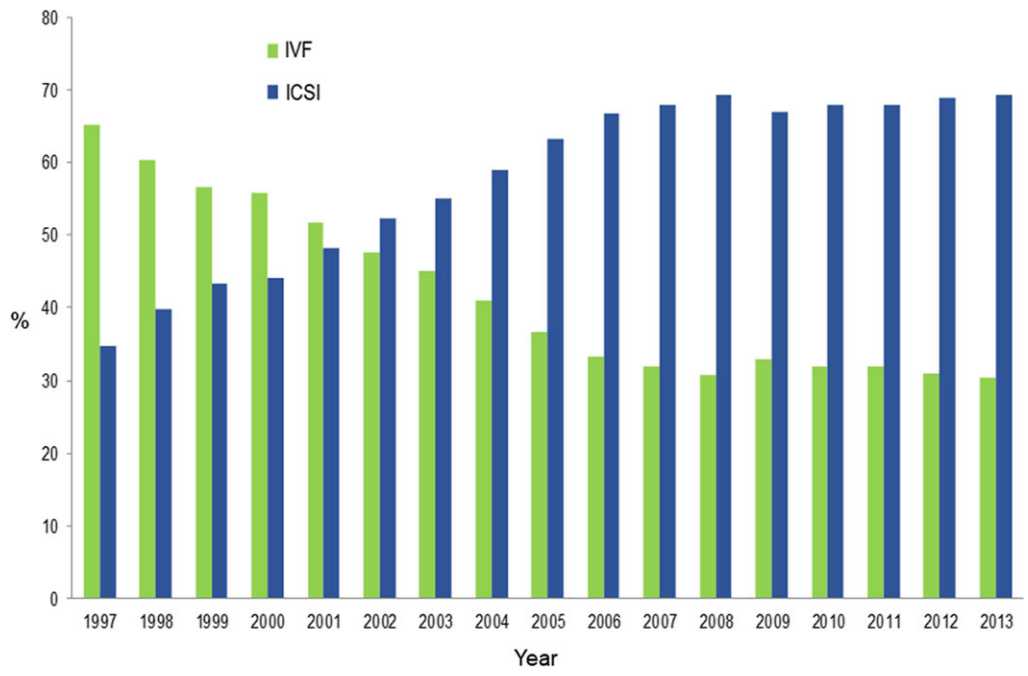

Figure 2 Proportion of IVF/ICSI in Europe 1997–2013.

proportion of ICSI to IVF cycles seems to have stabilized since 2008, after a continuous increase in the first decade of the EIM registry (Fig. 2).

Twenty-six countries reported 17 938 of 323 508 fresh cycles performed with donor semen (5.5%) and 27 countries reported 8731 of 329 329 cycles performed with surgically obtained partner's semen (2.7%). These numbers are similar to those of last years (2012).

Data on FER were available in all countries but Serbia (Tables I and II and Supplementary Table SVII). The technique was not performed in

Malta. Moreover, number of thawing/warming cycles was not available in 10 countries (Czech Republic, Finland, France, Hungary, Kazakhstan, Lithuania, Macedonia, Moldova, Norway and The Netherlands), making impossible the calculation of per thawing PR and delivery rates (DRs) for those countries. A total of 108 976 FER-thawing cycles and 147 487 FER-transfer cycles has been reported in 2013—18 127 (14%) more transfers than in 2012.

Overall, the proportion of FER transfers compared to 'fresh' transfers was 38.3% (34.5% in 2012), but in some countries the proportion was higher than 60%: 89.5% in Switzerland; 86.4% in Finland, 77.2% in The Netherlands, 75.2% in Iceland, and 68.6% in the Czech Republic. It remained less than 20% in eight countries.

The number of ED cycles, reported by 26 countries, was 40 244 (in 2012:23 countries with 33 605 cycles).

Regarding overall availability of ART, the number of cycles per million women of reproductive age (15–45 years) and per million inhabitants, in the 17 countries where data coverage was 100% is shown in Table I and Supplementary Table SIV. In 14 of those countries, babies born as a result of ART (IUI excluded) varied from 0.7% in Malta to 6.2% in Denmark. In Slovenia (6.0%), Finland (5.8%), and Czech Republic (5.7%) also more than 5% of all infants born had been registered by an ART programme. In contrast, Italy (1.9%), Poland (1.3%) and Moldova (0.9%) were the other countries in which this number was lower than 2%. No information was available for Hungary, Norway and The Netherlands.

Pregnancies and deliveries after treatment

Table II shows PR and DR per aspiration for IVF and ICSI, and PR and DR per thawing for FER (regardless of the technique). Mean PR and DR were computed for countries providing the relevant information. Hungary did not register data on deliveries. Norway did not provide information on deliveries this year. Austria and Serbia provided only total deliveries after IVF and ICSI combined.

On average, PRs per aspiration were 29.6% for IVF (+0.2% than in 2012) and 27.8% for ICSI (the same rate of 2012). In FER-cycles the PR per thawing was 27.0% (+3.9% when compared with 2012).

Significant national variations in clinical outcomes were apparent. In countries reporting 100% of ART activity, the rate of pregnancy per aspiration after IVF ranged from 15.9% in Czech Republic up to 39.3% in Moldova. For ICSI the variation was from 20.8% in Iceland to 39.9% in Moldova. For FER the rate of pregnancy per thawing varied between 13.0% (Estonia) and 31.4% (Slovenia).

As shown in Supplementary Tables SXIII and SXIV, several countries continue to experience difficulties in gathering full pregnancy outcome data. Overall, the pregnancies lost to follow-up were 8.3% (−0.5% than in 2012) for IVF and ICSI and 9.6% (the same value of 2012) for FER. The mean DRs per aspiration for IVF, ICSI and FER (per thawing) were 22.2, 20.1 and 18.0%, respectively (Table II). These figures represent the actual recorded deliveries, even though a number of deliveries may have occurred in the lost to follow-up group.

A detailed account of numbers of cycles, aspirations, transfers, pregnancies, deliveries and the corresponding rates per technique in each country are reported in Supplementary Table SV for IVF, Supplementary Table SVI for ICSI and Supplementary Table SVII for FER.

The number of documented pregnancy losses was reported by 34 countries for IVF and ICSI and by 32 countries for FER (Supplementary Table SXIII and SXIV). In these countries, the rates varied from 4.4 to 27.9% for fresh cycles (mean of 16.8%) and from 7.9 to 43.5% for FER (mean of 19.8%). In the 13 countries with complete coverage that provide these data, the average figures for documented pregnancy losses were 14.7% for fresh cycles and 17.7% for FER.

ED (fresh transfer) was reported by 25 countries (Supplementary Table SVIII). In most of the countries where data were not reported, this technique was not allowed. As in the last reports, the recipient cycles (transfers) were divided into fresh or frozen/thawed cycles. FOR and FER transfers were considered independently. In total, 18 495 clinical pregnancies resulted from 40 130 embryo transfers.

The mean PR was 49.8% (+1.4% compared with 2012) after 24 193 fresh transfers, 46.3% (+1.2% than in 2012) after 3905 transfer after FOR (13 countries) and 38.5% (+2.6% than in 2012) after 12 032 FER transfers. The overall mean DR per transfer (fresh, FOR and thawed embryos combined) was 29.5%, a value that may be a consequence of a significant loss for follow-up of pregnancies in Spain, by far the main contributor.

Eighteen countries out of the 22 in which embryo donation is allowed reported data on the technique: 4378 transfers were performed, with 1594 pregnancies (36.4% per transfer; 34.7% in 2012).

In total, 149 466 infants were born after IVF, ICSI, FER, ED and PGD/PGS in the 33 countries where the reporting included newborns (Table II). A total of 107 426 were born after IVF/ICSI fresh cycles (Supplementary Table XIII) and 29 603 were born after FER (Supplementary Table SXIV).

Age distribution

The age distribution of women treated with IVF and ICSI varied across countries (Supplementary Tables SIX and SX). The highest percentages of women aged 40 years or more submitted to IVF aspirations were found in Greece, Denmark and Hungary, whereas the highest percentages of women aged <35 years were found in Poland, Ukraine and Belarus. For ICSI aspirations, countries with the highest proportion of female patients 40 years or more were Greece, Italy and Hungary; those with more female patients <35 years old were Albania, Ukraine and Poland.

As expected, PRs associated with IVF and ICSI decreased with advancing age. The same trend was seen for DRs. For women ≥ 40 years undergoing IVF treatment, the DRs vary from 1.4% in Czech Republic to 22.2% in Serbia (Supplementary Table SIX). For ICSI the DRs vary from 3.0% in Iceland to 22.2% in Albania (Supplementary Table SX).

FER-cycles (Supplementary Table SXI) included a relatively higher percentage of young women (≤34 years: 48.4%) and, as in fresh cycles, PRs and DRs decreased with age.

In ED cycles (Supplementary Table SXII), the age of the recipient was 40 years or more in 62.6% of cases on average, and few countries reported a figure lower than 40%: Belarus (6.3%), Denmark (29.9%), Latvia (13.6%), Slovenia (25.0%) and Sweden (9.6%). PRs and DRs in oocyte recipients were comparable across different age groups.

Number of embryos transferred and multiple births

Table III summarizes the number of embryos transferred after IVF and ICSI combined. The total proportion of single embryo transfers (SETs)

Table II Results after ART in 2013.

Country	Initiated cycles IVF + ICSI	IVF			ICSI			FER			ART infants (IUI excluded)	ART infants per national births (%)
		Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Thawings	Pregnancies per thawing (%)	Deliveries per thawing (%)		
Albania	91				91	48.4	37.4	32	40.6	34.4	64	0.2
Austria		916	31.4		4905	32.5		1352	33.7			
Belarus	2245	1345	42.5	31.4	874	35.9	26.4	175	21.7	12.0	930	0.8
Belgium	20 295	3587	28.2	20.6	13 742	26.6	19.2	10 001	22.9	14.2	5805	4.6
Bulgaria	4186	446	23.8	17.0	3616	22.8	16.8	890	37.4	28.9	1285	1.9
Croatia	4309	1616	29.3	14.2	2228	22.9	15.8	466	28.3	20.6	784	
Cyprus	1151	187	38.0	34.2	914	30.1	26.1	330	46.4	30.9		
Czech Republic	12 980	1877	15.9	12.5	10 745	31.2	21.6				6137	5.7
Denmark	11 584	6155	22.7	19.7	5065	26.1	23.7	3166	19.5	16.6	3477	6.2
Estonia	1824	639	25.7	20.2	1167	26.6	19.9	884	13.0	7.4	558	4.0
Finland	4561	2359	28.6	21.6	1981	24.5	18.8				3371	5.8
France		21 205	23.6	19.3	39 136	23.5	20.0				18 041	2.2
Germany	55 966	12 531	29.4	19.7	43 435	27.6	19.4	20 456	22.1	14.6	16 916	
Greece	12 207	2270	32.2	17.6	9382	31.4	13.7	2024	35.9	16.1	4129	4.4
Hungary	5500	1249	28.7		4178	28.3						
Iceland		222	22.5	14.9	173	20.8	16.8	260	23.1	16.9	157	3.6
Ireland	1195	519	40.3	33.9	498	31.7	26.5	371	28.3	20.8	442	0.6
Italy	55 049	7008	24.1	16.9	43 165	20.9	13.8	7428	23.7	15.7	10 021	1.9
Kazakhstan	3288	1575	36.7	25.1	1698	43.2	32.6				1151	0.4
Latvia	441	109	26.6	2.8	252	24.2	13.1	124	19.4	8.9	59	0.3
Lithuania	343	190	38.4	18.9	148	33.1	9.5				66	0.2
Macedonia		305	41.0	11.1	1241	42.0	24.4				431	
Malta	100				100	28.0	28.0				31	0.7
Moldova	866	392	39.3	35.5	444	39.9	36.3				355	0.9
Montenegro	453				453	36.9	30.7	22	18.2	18.2	174	2.3
Norway	5849	2884	31.3	25.5	2720	31.1	25.0					
Poland	13 409	865	29.6	20.5	12 411	33.1	22.0	6151	28.2	16.7	4844	1.3
Portugal	5595	1940	33.8	25.6	3255	28.6	21.0	1334	27.9	17.5	1847	**2.3**
Romania	1839	960	40.1	26.6	780	36.2	27.7	538	37.7	16.7	734	0.4
Russia	51 010	23 663	33.8	24.6	25 631	30.5	21.3	11 879	31.4	18.4	17 951	0.9
Serbia	2720	550	32.7		2170	35.5					908	

Continued

Table II *Continued*

Country	Initiated cycles IVF + ICSI	IVF			ICSI			FER			ART infants (IUI excluded)	ART infants per national births (%)
		Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Thawings	Pregnancies per thawing (%)	Deliveries per thawing (%)		
Slovenia	3671	1064	31.5	25.4	2450	29.7	23.5	1039	31.4	25.1	1247	6.0
Spain	38 591	3976	30.2	18.2	30 386	28.2	18.1	14 255	30.9	18.0	17 807	4.2
Sweden	11 611	5307	31.0	24.8	5615	28.4	23.2	6063	27.8	22.0	4280	3.8
Switzerland	5420	739	22.5	16.8	4157	22.0	16.0	4134	20.1	14.4	1598	1.9
The Netherlands	15 165	6346	30.0	21.4	7310	31.5	22.9					
Ukraine	10 971	2862	38.5	27.4	7588	34.8	27.6	3404	37.4	28.7	4838	1.0
UK	45 402	19 021	31.5	27.3	23 978	32.6	28.7	12 198	28.4	24.9	19 028	2.4
All*	409 887	136 879	29.6	22.2	318 082	27.8	20.1	108 976	27.0	18.0	149 466	2.2

*Percentages refer to these countries where all data were reported for the given technique.
ART infants also include ED.
For IVF and ICSI there were for Albania, Belarus, Czech Republic, France, Greece, Kazakhstan, Latvia, Poland, Portugal, Russia and Serbia, respectively, 3, 35, 14, 267, 25, 130, 29, 57, 4, 1195 and 30 deliveries with unknown outcome. These were accepted as singletons to calculate the ART infants.
For the Czech Republic, Finland, France, Greece, Kazakhstan, Latvia, Lithuania, Macedonia, Malta, Moldova, Norway, Serbia and the Netherlands no data on the number of thawings were available.
For FER there were for Albania, Czech republic, Finland, France, Greece, Latvia, Poland, Portugal and Russia, respectively, 1, 13, 704, 5, 17, 11, 19, 4 and 416 deliveries with unknown outcome. These were accepted as singletons to calculate the ART infants.
For Austria and Serbia only the total numbers of deliveries for IVF and ICSI together were reported, leading to a DR per aspiration of 35% and 26%, respectively.

Table III Number of embryos transferred after ART and deliveries in 2013.

Country	IVF + ICSI								FER		
	Transfers	1 embryo (%)	2 embryos (%)	3 embryos (%)	4+ embryos (%)	Deliveries	Twin (%)	Triplet (%)	Deliveries	Twin (%)	Triplet (%)
Albania	87	5.7	69.0	23.0	2.3	34	35.5	0.0	11	30.0	0.0
Austria	6554	51.2	47.2	1.6	0.0	1998	14.0	0.2			
Belarus	2090	9.0	52.6	38.4	0.0	653	29.4	2.6	21	23.8	4.8
Belgium	15 303	53.1	38.8	7.1	1.0	3381	12.3	0.2	1420	11.3	0.3
Bulgaria	2546	29.7	41.0	24.5	4.8	684	22.4	0.3	257	23.3	0.0
Croatia	3272	37.2	55.5	7.3	0.0	591	15.1	0.0	96	8.3	0.0
Cyprus	960										
Czech Republic	10 503	57.2	40.5	2.1	0.1	2559	11.6	0.2	1501	12.9	0.1
Denmark	9265	48.9	46.7	4.4	0.0	2411	13.7	0.2	527	14.0	0.4
Estonia	1648	33.1	62.0	4.9	0.0	361	19.9	0.6	65	13.8	1.5
Finland	3790	77.3	22.7	0.0	0.0	881	6.0	0.0	704	6.8	0.0
France	48 181	37.4	55.9	6.4	0.3	11 912	15.8	0.2	3467	9.7	0.1
Germany	49 440	20.4	69.4	10.2	0.0	10 902	21.7	0.8	2991	15.2	0.7
Greece	9591	14.9	32.3	44.8	8.0	1684	20.7	1.3	326	17.5	2.6
Hungary	5032	18.4	60.6	18.7	2.3						
Iceland	327	55.0	45.0	0.0	0.0	62	9.7	0.0	44	11.4	0.0
Ireland	894	37.9	57.8	4.3	0.0	308	16.9	0.0	77	6.5	0.0
Italy	40 696	24.3	45.5	27.8	2.4	7125	20.1	1.0	1169	12.1	0.2
Kazakhstan	3034	18.3	71.7	9.6	0.4	947	18.4	1.3	166	8.4	0.0
Latvia	307	28.2	66.2	5.6	0.0	36	14.3	0.0	11		
Lithuania	330	21.8	36.7	41.5	0.0	50	16.0	8.0	5	0.0	0.0
Macedonia	1342	16.6	69.9	13.5	0.0	337	27.3	0.3	19	0.0	0.0
Malta	100	0.0	100.0	0.0	0.0	28	10.7	0.0			
Moldova	808	9.4	24.5	43.2	22.9	300	18.7	6.7	15	6.7	0.0
Montenegro	415	21.2	30.1	46.0	2.7	139	22.3	0.0	4	0.0	0.0
Norway	4831										
Poland	11 371	42.2	55.5	2.2	0.1	2904	14.7	0.2	1026	9.4	0.0
Portugal	4336	22.9	73.0	4.0	0.0	1180	17.9	0.0	234	12.6	0.0
Romania	1649	11.9	54.3	28.7	5.2	471	23.1	0.8	90	24.4	3.3
Russia	42 471	23.4	63.6	12.2	0.8	11 275	23.0	0.9	2188	16.0	0.7
Serbia	2540	19.7	22.8	57.5	0.0	710	27.9	0.0	10	100.0	0.0
Slovenia	2988	44.9	53.9	1.2	0.0	845	12.1	0.1	261	11.1	0.0
Spain	26 234	21.8	71.5	6.8	0.0	6232	20.9	0.3	2560	16.1	0.1
Sweden	9390	76.9	23.1	0.0	0.0	2621	5.4	0.0	1333	3.6	0.0
Switzerland	4035	25.9	62.2	11.8	0.0	788	15.9	0.1	596	13.6	0.5
The Netherlands	12 119					3029	5.6	0.0	1439	4.1	0.2
Ukraine	9040	14.8	59.3	25.4	0.5	2878	25.4	0.6	976	22.0	0.3
UK	39 113	42.9	52.7	4.3	0.0	12 091	15.1	0.3	3039	14.0	0.2
All*	386 632	31.4	56.3	11.5	1.0	90 618	17.5	0.5	26 165	12.5	0.3

*Percentages refer only to these countries where data on number of transferred embryos and on multiplicity were reported.

was 31.4%. Information on numbers of elective single transfers is not available. Double embryo transfers (DETs) occurred in 56.3% of the cycles with embryo transfer, triple embryo transfers were reported in 11.5% and four or more embryos were transferred in 1.0% of the transfers. Figure 3 shows the trends of the numbers of embryos transferred since the first EIM report.

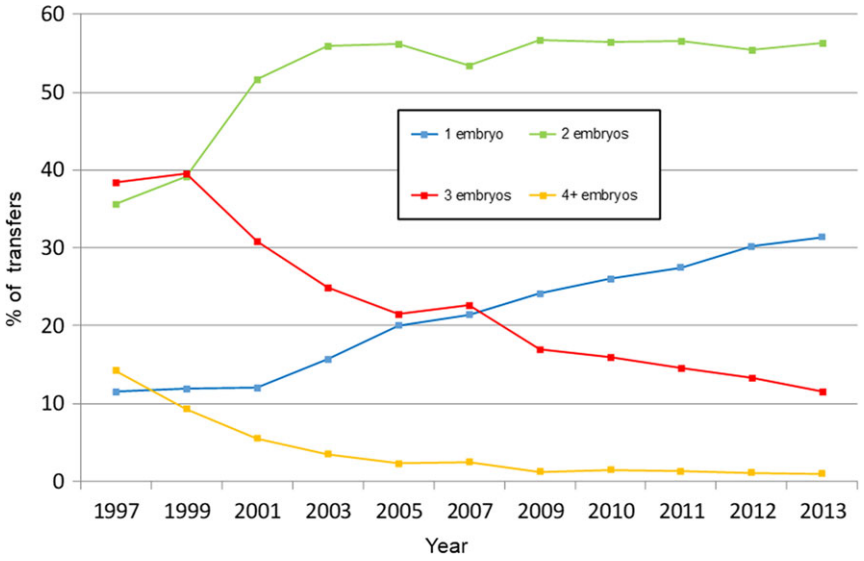

Figure 3 Number of embryos transferred in IVF/ICSI fresh cycles in Europe 1997–2013.

As shown in Table III, major differences were seen between countries concerning the number of embryos transferred. Six countries reported a SET rate of over 50% (Finland 77.3%, Sweden 76.9%, Czech Republic 57.2%, Iceland 55.0%, Belgium 53.1% and Austria 51.2%). The proportion of triple embryo transfers ranged from 0% in Finland, Sweden, Malta and Iceland to ≥40% in Greece, Lithuania, Moldova, Montenegro and Serbia (that reported the highest rate: 57.5%). The transfer of four or more embryos was over 2% in eight countries and ranged from 0 (in 20 countries), to 22.9% in Moldova.

In FER-cycles, the proportion of single, double, triple and ≥4 embryos transfers was 43.8, 49.0, 7.0 and 0.2%, respectively. In ED, the figures were 27.4, 62.1, 9.4 and 1.0%. However, for ED 7% of transfers were of a non-disclosed number of embryos.

In fresh IVF/ICSI cycles, the percentages of multiple deliveries were 18.0% in total, ranging from 6.0% in Finland up to 35.5% in Albania; 17.5% were twins (17.3% in 2012) and 0.5% triplets (0.6% in 2012) (Table III). Some countries registered a high triplet DR, such as Lithuania (8.0%), Moldova (6.7%) and Belarus (2.6%). Nineteen countries were able to maintain the triplet deliveries at ≤0.2% and 11 of them reported none. The twin DR ranged from 5.4% in Sweden to 35.5% in Albania. After FER, the percentages were 12.5% for twins (12.2% in 2012) and 0.3% for triplet deliveries (0.3% in 2012) (Table III). Additional data on pregnancy outcome, singleton and multiple deliveries are provided in Supplementary Tables SXIII and SXIV.

In ED, of 10 880 deliveries with information regarding multiplicity, 2673 were twins (24.6%) and 47 were triplets (0.4%), values not different from those of 2012 (data not presented in tables).

Perinatal risks and complications

Supplementary Table SXV summarizes the risk of preterm deliveries according to the number of newborns. Data were available from 18 countries. These show that the risk of extreme preterm birth (gestational weeks 20–27) increased from 1.3% (1.0% in 2012) for a singleton delivery, to 2.9% (3.6% in 2012) for twins and 8.3% (6.3% in 2012) for triplets. The same trend was noted for very preterm birth (28–32 weeks), from 2.4 to 9.2% and 31.2%, respectively. Term delivery (37+ weeks) rate was 87.1% for singleton, 49.1% for twins and only 11.7% for triplets.

Ovarian hyperstimulation syndrome (OHSS) was reported in 26 of the 38 countries (Supplementary Table SXVI). In total, 1845 cases of OHSS were recorded, corresponding to a prevalence of 0.4% (0.6% in 2012) of all stimulated cycles in the countries reporting that information. The rate varied between 0 and 1.4%. The table also includes data on the incidence of other adverse outcomes, such as bleeding (793 cases), infection (78 cases) and fetal reductions (416 cases). Maternal death was reported in two cases (three cases were reported in 2012).

PGD/PGS

PGD/PGS activity, recorded from 20 countries (19 in 2012) (Table I), involved 9791 fresh and 1069 thawing cycles, resulting in 4245 fresh and 1061 frozen embryo transfers. A total of 1618 pregnancies (38.1% per transfer) and 1298 deliveries (30.6% per transfer) resulted from fresh cycles. Corresponding figures for FER were 415 (39.1% per transfer) and 307 (28.9% per transfer). The main contributor was Spain with 3407 cycles. More complete data and detailed analysis of PGD/PGS in Europe was published separately by ESHRE's PGD Consortium (De Rycke *et al.*, 2015).

IVM

IVM was recorded in 10 countries (Table I). A total of 247 aspirations (421 in 2012) and 137 transfers were recorded, resulting in 35 pregnancies and 25 deliveries. France and Poland accounted together for 62.1% of immature oocyte aspirations and 80% of deliveries after IVM.

Table IV Intrauterine insemination with husband (IUI-H) or donor (IUI-D) semen in 2013.

Country	IUI-H						IUI-D					
	Cycles	Deliveries	Deliveries (%)	Singleton (%)	Twin (%)	Triplet (%)	Cycles	Deliveries	Deliveries (%)	Singleton (%)	Twin (%)	Triplet (%)
Albania	52	4	7.7	100.0	0.0	0.0						
Austria												
Belarus	830	106	12.8	89.4	10.6	0.0	12	4	33.3	100.0	0.0	0.0
Belgium	12 721	746	5.9	94.6	5.0	0.4	7720	468	6.1	96.1	3.9	0.0
Bulgaria	1349	106	7.9	88.7	11.3	0.0	284	31	10.9	90.3	9.7	0.0
Croatia	1642	143	8.7	85.1	13.5	1.4						
Cyprus												
Czech Republic												
Denmark	9195	1067	11.6	86.6	11.8	1.6	10 093	699	6.9	93.8	5.6	0.6
Estonia	153	7	4.6	85.7	14.3	0.0	125	12	9.6	100.0	0.0	0.0
Finland	3278	295	9.0	91.9	7.8	0.3	1155	142	12.3	97.2	2.8	0.0
France	53 555	5394	10.1	88.8	10.8	0.4	3677	678	18.4	90.7	9.0	0.3
Germany												
Greece	3710	357	9.6	90.2	9.5	0.3	495	50	10.1	92.0	8.0	0.0
Hungary												
Iceland												
Ireland	558	54	9.7	94.4	5.6	0.0	193	26	13.5	100.0	0.0	0.0
Italy	27 109	1810	6.7	91.4	7.8	0.7						
Kazakhstan	737	23	3.1	100.0	0.0	0.0	114	7	6.1	100.0	0.0	0.0
Latvia	24	0					54	4	7.4	100.0	0.0	0.0
Lithuania	551	20	3.6	85.0	15.0	0.0						
Macedonia												
Malta												
Moldova	207	18	8.7	100.0	0.0	0.0	23	7	30.4	100.0	0.0	0.0
Montenegro	105	14	13.3	85.7	14.3	0.0						
Norway	190	17	8.9	94.1	5.9	0.0	330	72	21.8	98.6	1.4	0.0
Poland	12 447	1055	8.5	93.5	6.2	0.3	2145	294	13.7	93.4	6.6	0.0
Portugal	2092	196	9.4	85.7	12.8	1.5	190	47	24.7	72.3	27.7	0.0
Romania	1690	121	7.2	91.7	8.3	0.0	416	28	6.7	89.3	10.7	0.0
Russia	7729	753	9.7	93.0	6.6	0.4	3365	554	16.5	94.0	6.0	0.0
Serbia	1370											
Slovenia	739	64	8.7	85.9	12.5	1.6						
Spain	22 025	1705	7.7	88.7	10.5	0.8	7525	1002	13.3	89.0	10.4	0.6
Sweden							755	111	14.7	88.3	10.8	0.9
Switzerland												
The Netherlands												
Ukraine	1768	120	6.8	98.3	1.7	0.0	497	43	8.7	97.7	2.3	0.0
UK	9640						4617	591	12.8	93.1	6.8	0.2
All*	175 467	14 195	8.6	89.9	9.5	0.6	43 785	4870	11.1	92.2	7.5	0.3

*Total refers to these countries where data were reported and mean percentage were computed on countries with complete information.
Italy, Spain: underestimation of deliveries because of high number of pregnancies lost to follow-up.
Macedonia: Data from two clinics only.
Poland: For IUI-H and IUI-D there were, respectively, 282 and 63 pregnancies with unknown outcome.

FOR (ED not included)

FOR was recorded by 12 countries (Table I), with a total of 6611 thawing cycles (5549 in 2012), 5547 transfers, 2191 pregnancies and 1049 deliveries. The vast majority (86.9%) was performed in Italy and Spain.

Intrauterine insemination

In 2013, 27 countries reported IUI cycles, with a total of 1297 clinics, 1095 of which (84.4%) were reporting to the EIM (Table I).

Table IV provides data on IUI-H and IUI-D cycles. With regard to insemination with IUI-husband/partner's semen, 175 467 cycles (175 028 in 2012) were reported by 27 countries, the main contributors being France, Italy, Spain, Belgium and Poland. Among the 24 countries reporting deliveries, the mean DR per cycle was 8.6% (8.5% in 2012), with 9.5% (9.0% in 2012) of deliveries being twin and 0.6% (0.4% in 2012) triplet deliveries.

For IUI-Donor insemination, 43 785 cycles (43 497 in 2012) were reported by 21 countries, the main contributors being Denmark, Belgium and Spain. The DR per cycle was 11.1% (12.0% in 2012), with multiple DRs of 7.5% (7.2% in 2012) for twins and 0.3% (0.5% in 2012) for triplets.

Data available on outcomes in women below 40 years and 40 years or more are presented in Supplementary Tables SXVII and SXVIII. The DR associated with IUI-H declined with age (8.4% below 40 versus 4.0% above) and the multiple DR decreased from 8.9 to 3.2% for twins, and from 0.7 to 0.2% for triplets. Similar findings were seen in IUI-D, where DRs decreased from 11.6 to 4.0%, twin deliveries from 7.6 to 1.7% with no difference in triplets (0.3 versus 0.4%).

Sum of fresh and FER ('cumulative') DRs

Supplementary Table SXIX gives an estimate (not a true rate) of a cumulative DR in countries performing FER and reporting deliveries. The calculation is presented as the sum of fresh and FER deliveries as nominator and the number of aspirations of the same year as denominator.

Overall, the increase after inclusion of FER deliveries was from 20.9 to 26.9% in the 35 countries providing these data. In 22 countries the 'benefit' using our definition of cumulative DR was more than 5.0% and in seven of them it was greater than 10%: Finland (+16.3%), Switzerland (+12.2%), Sweden (+12.2%), Albania (+12.1%), Czech Republic (+11.9), Iceland (+11.1%) and The Netherlands (+10.5%).

Cross-border reproductive care

Twelve countries reported data on cross-border patients: Albania, Belarus, Denmark, Iceland, Lithuania, Malta, Moldova, Poland, Portugal, Slovenia, Spain and Switzerland. A total of 4608 cycles were reported, 50.3% of which involved IVF/ICSI with the couple's own gametes, 19.4% were oocyte donations and 27.0% were IVF or ICSI with semen donation. Additionally, 5811 IUI with sperm donation were registered. Information regarding the countries of origin was very incomplete and not reliable enough to obtain any conclusive information. The main reasons reported by patients were to have access to a technique not legally available in their home countries (36.9%) or to seek a higher quality of treatment (28.6%).

Discussion

The present report is the 17th consecutive, annual European report on ART data. Taken together, these reports cover more than 7 million treatment cycles from 1997 to 2013 and 1 308 289 infants.

In spite of some positive changes in the last years, the registry systems remain very much diverse among countries. As a consequence, some data are not reported and a number of countries have been unable to provide some important information, such as initiated cycles and deliveries. Another area of concern is the weakness or absence of data validation methodologies in the vast majority of the European countries. Nevertheless, even though some results may be questioned, the findings reported in this paper are extremely relevant because they reveal important trends in practice and outcomes in Europe over time and give a clear picture of the differences existing among countries.

Participation in the EIM registry was in 2013 slightly higher compared with 2012, as the number of countries reporting was 38, four more than in 2012. Bosnia, Slovakia and Turkey are members of the EIM consortium but were not able to participate. As in previous years, data were also not available this year for Azerbaijan, Georgia and Kosovo. Some other independent very small European states never participated in this effort (Andorra, Armenia, Liechtenstein, Luxemburg, Monaco, San Marino and Vatican City). Overall, the EIM has been collecting data from nearly 80% of the European countries for several years.

In 2013, the mean of the proportions of clinics providing ART data was 85.4%, higher than in 2012. The countries with the lowest proportions of clinics reporting were Albania, Bulgaria and Kazakhstan.

The number of countries with 100% coverage was 17, close to previous years.

Overall the number of reported cycles of IVF and ICSI using own eggs increased by 7.2%. Comparing the 34 countries which reported also in 2012, an increase of IVF/ICSI cycles from 452 578 to 471 428 could be demonstrated (4.2%). Important variations in the amount of reported ART activity by some countries have occurred compared with 2012. Four countries showed an increase above 40% and four a decline greater than 20%. This decrease may not mirror a real situation since none of the latter countries has a registry that fully covers the ART activity. Clear reasons for the reported increase are not distinct although we must note that Greece and Kazakhstan, two of the countries with relevant increase in number of reported cycles, moved from a volunteer to compulsory registry. A mixture of improved registry systems and consequences of the economic situation could also be addressed here.

In 2013, the USA (CDC, 2015) reported 93 787 started IVF/ICSI cycles (99 665 in 2012). For Australia and New Zealand 43 084 initiated cycles were reported (42 299 in 2012) (Macaldowie, 2014).

The proportion of ICSI versus conventional IVF procedures remained stable in the last years (2013:69.6%) with more than two-thirds of ART cycles involving ICSI (Fig. 2). The drop from 2008 to 2009 is likely to have been driven by the absence of data from Turkey after 2008, a country with a very high use of ICSI (98% in 2008). A marked variation in the relative proportions of IVF and ICSI within Europe is clear, and the difference seems to have a geographic distribution. In several countries from northern and eastern Europe (Belarus, Denmark, Finland, Iceland, Ireland, Lithuania, Norway, Romania) IVF remains the dominant technology. In contrast, in most

countries from western and central Europe (Albania, Austria, Bulgaria, Cyprus, Czech Republic, Greece, Italy, Malta, Montenegro, Poland, Spain, Switzerland) ICSI was used in 80% or more of cases.

In Australia and New Zealand, 68.0% of all non-donor cycles used ICSI in 2013 and in the USA the corresponding figure was 69%, reflecting a trend throughout the world in performing ICSI in the majority of the cycles.

The impressive predominance in the use of ICSI cannot be explained by a proportional increase in male infertility but rather by a liberal use of this technique in cases with mixed infertility, unexplained infertility, mild male factor infertility, low oocyte number and fertilization failures. However, the observed differences among different European countries can only be explained by differences in professional strategy, clinical decision-making and insurance-strategies, since overall results of ICSI treatments have not been better than with IVF in EIM reports.

Availability of ART is a very relevant topic. The cultural and legal conditions, insurance/public funding systems, and structure of data collection can influence not only the amount of treatment cycles per inhabitant but also the success rates. This has to be taken into account when comparing different annual reports.

As shown in Table I and Supplementary Table SIV, the average number of treatment cycles per million inhabitants in the countries with 100% reporting coverage was 1175 (1252 in 20 121), and 6 210 (6 519 in 2012) per million females of reproductive age (15–45 years). Huge differences in access (cycles/million females of reproductive age) exist among countries, with the highest figures from Denmark (14 453), Belgium (13 694) and Slovenia (12 404), and the lowest from Moldova (1207).

Some years ago the ESHRE Capri Group estimated that IVF/ICSI services for 1500 couples with current infertility per annum per million inhabitants would be required to fulfill the ART needs of a population (and each couple would need on average more than one cycle of treatment) (2001). Out of the 17 countries where that evaluation is possible (those with full coverage of activity reporting), only three countries reported more than 1500 IVF/ICSI cycles/million inhabitants – Denmark (2068), Slovenia (1782) and Belgium (1553) while 10 countries reported <1000 of those cycles (Finland, France, Hungary, Italy, Malta, Moldova, Poland, Portugal, The Netherlands and UK) (Table I).

Also, the percentage of newborns conceived through ART (not including IUI) varied widely among countries, from 0.2% in Albania and Lithuania to 6.2% in Denmark, with a total of seven countries exceeding 4% of ART contribution to national natality (Table II).

The reporting of efficacy of ART is a very difficult issue nowadays. Live birth per initiated cycle seems to persist as the most adequate way to address this issue. However, the freeze-all policy followed at present by many clinics and the multiple frozen embryo transfers resulting from the same cycle represent important challenges to registries and make this outcome less strong than years ago. Cumulative live birth rate per initiated cycle has been proposed as the best performance indicator (Wilkinson *et al.*, 2017) but the frequently long temporal lag until all FER resulting from a same cycle be performed creates obstacles impossible to overcome by most registries. Also, the frequent geographic movements of people and biological material, namely embryos, are very important difficulties to registries. A novel strategy to follow patients and their biological material in Europe, i.e. the allocation of an individual code to each person involved in ART treatments, was proposed recently (De Geyter *et al.*, 2016). Until some change could be implemented in the individual countries, we need to stay with the current best available data. As stated before, some countries could not provide the number of initiated cycles. Moreover, the very low percentage of cancellations reported in some countries points out the difficulty in getting information on all initiated cycles. Therefore, the outcome that is available in all countries is the PR per aspiration. In the last few years no relevant change has been apparent for IVF, in spite of a positive trend: 29.6% in 2013 (2012: 29.4%, 2011:29.1%). For the ICSI treatment the PR per aspiration remained stable: 27.6% in 2013 (2012: 27.8%, 2011:27.9%).

DRs per aspiration and per transfer for IVF (22.2 and 26.0%, respectively) showed no change, compared with figures from previous years (2012: 21.9 and 25.2%; 2011: 21.7 and 24.8%) The corresponding figures for ICSI (20.1 and 23.9%, respectively) were also similar to those of 2012 (20.1 and 23.4%) and 2011 (19.9 and 22.7%). The DR per thawing for FER (18.0%) continues to increase (2012: 16.0%, 2011: 14.4%). These numbers must be interpreted with caution owing to the difficulties of some countries to report the outcome of pregnancies. The same applies to the rate of pregnancy losses that may be underestimated.

The DRs in Europe remain lower than in the USA, where in ART fresh non-donor cycles performed in 2013 the DR (live birth) per cycle was 29.2% and the DR per transfer was 37.3% (CDC, 2015). The outcomes in Europe were not clearly different from those achieved in Australia and New Zealand, where the DRs (live deliveries) in fresh cycles were 16.3% per aspiration and 23.7% per transfer, with a majority of cycles ending in an elective SET (eSET) (Macaldowie *et al.*, 2015). However, data on deliveries and infants must be considered and compared with some caution because of the difficulties met by several European countries in gathering pregnancy outcome, while the pregnancy loss to follow-up was low in the annual reports both in the USA and in Australia/New Zealand.

The number of embryos transferred is generally considered an indicator of quality because of its impact on the proportion of multiple pregnancies (and associated obstetrical and neonatal complications). Overall, in 2013, in fresh non-donor cycles, the number of transfers with 3+ embryos (12.5%) was lower than ever before (2012: 13.7%; 2011: 15.8%) while the mean percentage of SETs (intended and not intended) increased from 30.2% in 2012 to 31.4% (2011: 27.5%). The proportion of DET had a slight increase to 56.3% (55.4% in 2012). Those numbers reflect a continuous increase of SETs and continuous decrease of 3+ embryos transfers.

The highest proportions of SETs were found mainly in Scandinavian countries and Belgium. In contrast, ≥40% of 3+ embryo transfers were reported in Greece, Lithuania, Moldova, Montenegro and Serbia, reflecting cultural, social and financial based options.

The EIM reports are unable to discriminate between eSET (intended) versus SET in general (unintended), but the increase in the number of transfers of one embryo seen in the last years is undoubtedly due to an increase in eSET. Despite huge differences in embryo transfer policy across countries, the overall trend towards transferring fewer embryos seen over the last 10 years seems to continue (Fig. 3).

In comparison with the situation in Europe, data from other registers show that SET was performed in 75.6% (2012: 76.3%) of cycles in Australia and New Zealand (Macaldowie *et al.*, 2015) and 23.6% (2012: 19.5%) in the USA (CDC, 2015).

In spite of the reduction of the number of transfers of 3+ embryos in 2013, the multiple DRs (twins + triplets) in IVF and ICSI cycles

remained stable: 17.5 and 0.5%, respectively (2012: 17.1 and 0.6%, respectively). The relevance of these figures is unquestionable when we consider also data describing preterm birth rates according to the number of fetuses in the pregnancy (Supplementary Table XV), which was completed by 18 countries. The risk of extreme preterm birth (<28 weeks) was increased more than 2-fold for twins and more than 6-fold for triplets and the risk of very preterm birth (28–32 weeks) was increased almost 4-fold for twins and 13-fold for triplets.

Figures for multiple-infant birth rate (twins, triplets or more) point to important differences between the USA (26.6%), Europe (18.7%) and Australia/New Zealand (5.6%), that persisted in 2013. The latter number shows the benefits of the eSET and stresses the need to implement such a policy in many more countries in Europe.

Fetal reductions remain an issue. As they are almost always performed in triplet or higher order gestations, when analyzing the figures of triplet DRs in different countries, the number of fetal reductions should also be considered. A total of 416 procedures were reported (69 less than in 2012) (Supplementary Table XVI). However, this number is likely to be an underestimate since several countries, including large countries such as Germany and Italy, did not report data on this intervention. Without fetal reductions, the proportion of triplet deliveries would have been probably much higher. Still, everything should be done to prevent fetal reduction as a means to decrease high order multiple delivery in ART.

As expected the effect of women's age on treatment outcome is clearly shown again in 2013. The PRs per aspiration in IVF cycles decreased from 36.6% in women aged less than 35 years, to 16.9% in those aged 40 years or more (Supplementary Table SIX). Similar trends were noted for ICSI (from 35.1 to 14.3%, Supplementary Table SX) and FER (from 29.6 to 18.4%, Supplementary Table SXI), but not for ED (Supplementary Table SXI). These supplementary tables also provide DRs per aspiration. 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.

Regarding ED, it was possible again to evaluate the outcome of fresh, FER and FOR separately (Supplementary Table SVIII): the PR per transfer was 49.8, 46.4 and 38.5%, respectively. The results of FOR cycles, reported by 13 countries, are very promising as they look close to those of fresh cycles. FER results, although improving, are still clearly lower, a situation that repeats previous years and must raise some concern about the widespread freeze-all policy.

As stated above, with the noticeable decline in the number of embryos transferred and the increasing proportion of FER-cycles, the cumulative DR per started cycle is a very relevant outcome for ART. This figure can only be obtained a few years after the initial oocyte aspiration and not many countries are able to report this information. So, we present the 'cumulative' DR (Supplementary Table XIX) as the sum of fresh and FER deliveries (nominator) by the number of aspirations (denominator) in the same calendar year. This calculation can be methodologically flawed and is clearly not a cumulative DR per initiated cycle, but the estimate may be close to the actual figure. In several countries, FER deliveries added substantially (more than 10% in seven countries) to the DRs per aspiration, justifying their transfer and freezing policies.

Safety is also addressed in EIM registry. Regarding direct risks of ART, OHSS was recorded in 0.4% of all stimulated cycles. Other complications are extremely rarely reported. However, the figures on complications may be an underestimation of the real incidence because of incomplete reporting.

For the 12th consecutive year, the present report includes European data on treatments with IUI-H (175 463 cycles) and IUI-D (43 785 cycles), a level of activity that is quite similar to 2012.

Compared with past years, no significant differences have been noted in terms of DRs that remained around 9% for IUI-H and 11% for IUI-D. Also, the incidence of multiple pregnancies after IUI was not different in 2013.

European countries have very different legal/regulatory frames and cross-border reproductive care is, therefore, a relevant social phenomenon. However, until an adequate registry system is implemented, the information available is very weak. In this report, the EIM Consortium continues to address this topic using an optional module included in the data collection system. A total of 4608 cycles were reported in 2013 by 12 countries. This number is much lower than estimated, based on the cross-border reproductive care study performed in Europe (Shenfield *et al.*, 2010). Regarding the countries of origin and reasons for traveling, only incomplete information could be gathered.The EIM questionnaire does not cover information about oocyte cryopreservation and ovarian tissue cryopreservation. The first European overview on this topic was recently published in cooperation with the EIM (Shenfield *et al.*, 2017).

In summary, the 17th ESHRE report on ART for Europe shows a continuing moderate expansion in the number of treatment cycles, with more than 680 000 cycles reported in 2013. The use of ICSI seems to have reached a plateau. PRs and DRs after IVF or ICSI remained relatively stable compared to previous years. The number of multiple embryo transfers (3+ embryos) was the lowest ever but the multiple DR has not changed.

Supplementary data

Supplementary data are available at *Human Reproduction* online.

Authors' roles

V.G. performed the calculations. C.C.-J. 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 fully collaborative work.

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Conflict of interest

There are no competing interests.

Appendix

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