International Committee for Monitoring Assisted Reproductive Technology: world report on assisted reproductive technology, 2005

Fernando Zegers-Hochschild, M.D.,[a] Ragaa Mansour, M.D., Ph.D.,[b] Osamu Ishihara, M.D., Ph.D.,[c] G. David Adamson, M.D.,[d] Jacques de Mouzon, M.D., M.P.H.,[e] Karl G. Nygren, M.D., Ph.D.,[f] and Elizabeth A. Sullivan, M.D., M.P.H.[g]

[a] Clinica las Condes and Program of Ethics and Public Policies In Human Reproduction, University Diego Portales, Santiago, Chile; [b] Egyptian IVF-ET Center, Cairo, Egypt; [c] Saitama Medical University Hospital, Moroyama, Japan; [d] Palo Alto Medical Foundation Fertility Physicians of Northern California, Palo Alto and San Jose, California; [e] IVF Unit, Institut National de la Santé et de la Recherche Médicale Service de Gynécologie Obstétrique II et de Médecine de la Reproduction, Groupe Hospitalier Cochin-Saint Vincet de Paul, Paris, France; [f] Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden; and [g] National Perinatal Epidemiology and Statistics Unit, School of Women's and Children's Health, University of New South Wales, Sydney, New South Wales, Australia

Objective: To analyze information on assisted reproductive technology (ART) performed worldwide and trends in outcomes over successive years.
Design: Cross-sectional survey on access, effectiveness, and safety of ART procedures performed in 53 countries during 2005.
Setting: A total of 2,973 clinics from national and regional ART registries.
Patient(s): Infertile women and men undergoing ART globally.
Intervention(s): Collection and analysis of international ART data.
Main Outcome Measure(s): Number of cycles performed by country and region, including pregnancies, single and multiple birth rates, and perinatal mortality.
Result(s): Overall, 1,052,363 ART procedures resulted in an estimated 237,315 babies born. The availability of ART varied by country from 15 to 3,982 cycles per million of population. Of all initiated fresh cycles, 62.9% were intracytoplasmic sperm injection. The overall delivery rate per fresh aspiration was 19.6% and for frozen embryo transfer 17.4%, with a cumulative delivery rate of 23.9%. With wide regional variations, single embryo transfer represented 17.5% of cycles, and the proportion of deliveries with twins and triplets from fresh transfers was 23.6% and 1.5%, respectively.
Conclusion(s): Systematic collection and dissemination of international ART data allows patients, health professionals, and policy makers to examine and compare the impact of reproductive strategies or lack of them as markers of reproductive health. (Fertil Steril® 2014;101:366–78. ©2014 by American Society for Reproductive Medicine.)
Key Words: ART, assisted reproductive technology, registry, outcomes, multiple births, public health, IVF

Discuss: You can discuss this article with its authors and with other ASRM members at http://fertstertforum.com/zegers-hochschildf-art-icmart-world-registry/

Use your smartphone to scan this QR code and connect to the discussion forum for this article now.*

* Download a free QR code scanner by searching for "QR scanner" in your smartphone's app store or app marketplace.

This is the 11th world report on assisted reproductive technology (ART), produced by The International Committee for Monitoring Assisted Reproductive Technology (ICMART). Similar reports have been generated and published since 1989 by the International Working Group on Assisted Reproduction, later renamed ICMART. The last communication on world data included ART cycles performed during 2004 (1). The aim of this report is to provide international information on availability, effectiveness, and perinatal outcomes of ART treatment cycles performed during 2005 and babies born during 2006. It is also our aim to describe how these

Received August 26, 2013; revised and accepted October 4, 2013; published online November 1, 2013.
F.Z.-H. has nothing to disclose. R.M. has nothing to disclose. O.I. has nothing to disclose. G.D.A. has received research funding from Auxogyn and holds stock in Advanced Reproductive Care and XDhealth. J.d.M. has nothing to disclose. K.G.N. has nothing to disclose. E.A.S. has nothing to disclose.
Reprint requests: Fernando Zegers-Hochschild, M.D., Clinica las Condes, Unit of Reproductive Medicine, 441 Lo Fontecilla, Santiago, Chile (E-mail: fzegers@clc.cl).

Fertility and Sterility® Vol. 101, No. 2, February 2014 0015-0282/$36.00

http://dx.doi.org/10.1016/j.fertnstert.2013.10.005

biomedical markers are influenced by regional characteristics. As we have shown in previous world reports, there are marked national and regional differences in access to ART by infertile couples, which ultimately influence the way in which ART is practiced (1, 2).

MATERIALS AND METHODS

The data corresponding to ART treatment cycles performed during 2005 were collected from five regional ART registries compiled from national registry data in Europe and North America and from individual ART clinics gathered together in a regional registry in Latin America, Australia/New Zealand, and the Middle East, and from national registries directly reporting to ICMART in Asia and Israel. Institutional review board approval was not obtained by ICMART because such approvals were obtained as appropriate in individual countries, no individual data were submitted, and only aggregated national data were reported to ICMART.

The ICMART data collection uses forms describing the organization of each country's register, the practice of ART, and the results of IVF, intracytoplasmic sperm injection (ICSI), and frozen embryo transfer (FET), and includes initiated cycles, follicular aspirations, ETs, clinical pregnancies, deliveries, and newborns. Whenever available, these variables are further classified according to the fertilization technique, woman's age, number of embryos transferred, and gestational age at delivery. Other forms describe preimplantation genetic diagnosis (PGD), oocyte donation (OD), immediate complications for women, and congenital anomalies detected during the perinatal period. The ICMART forms for data collection can be found at www.icmartivf.org.

During the reported period (2005–2006), the 2002 ICMART–World health Organization ART glossary was used as the reference for terminology (3). The present report covers ART cycles performed during the year 2005 and is based on aggregated country data, which, after collection, were transferred to the Uppsala Clinical Research Center, Uppsala University, Uppsala, Sweden, where data were checked for consistency and a statistical report was generated. The delay in reporting data is partially due to delay in countries collecting their own data, logistical difficulties in international data collection, ICMART's development of new formats and procedures, and the transition of ICMART data collection to involve the University of Uppsala, Sweden.

Data are presented by country and region. In countries missing some data, estimations were made according to the following premises. [1] When the number of initiated cycles was unavailable, an estimation of this number was made by adding the average cycle cancellation rate (6.5%) to the number of aspiration cycles. For national registries with incomplete coverage, the number of initiated cycles per country was estimated by dividing the reported number by the percentage of participating clinics as reported or estimated by each country. [2] The number of babies born, when not reported by a registry, was estimated by using the reported clinical pregnancy rate (PR), average miscarriage rate, and multiple live birth rates in those countries that reported all of those variables. Finally, the total number of babies born worldwide from 2005 ART procedures was estimated by using the hypothesis that the missing countries, mostly in Asia, Africa, Oceania, and West Indies, performed between 10% and 20% of the world activity in ART. [3] Availability is expressed as the number of cycles (estimated) per million inhabitants in 2005. [4] The cumulative delivery rate (DR) per aspiration was calculated by adding the FET deliveries to those obtained from fresh transfers and dividing the sum by the number of aspirations.

RESULTS

The results are presented in Tables 1–4. Additional results are provided in Supplemental Tables 1–6 and Supplemental Figures 1–6, which are available online.

Availability

Data were received from 2,973 clinics in 53 countries in 2005, comprising more clinics and one more country than in 2004 (1). These clinics represented 78.8% of all registered clinics in those countries. Europe had the largest number of reporting clinics at 923 (39%), followed by Asia with 875 (37%) and North America with 370 (15.6%). The size of the reporting clinics also had geographic variations. Clinics reporting <100 cycles were mainly located in Asia (59.9%) and Latin America (43.8%). Nearly 20% of clinics performed >500 cycles per year, but large-sized clinics ($>1,000$ cycles) were mainly located in Australia/New Zealand (37.9%) and Israel (29.2%). Twenty-seven countries distributed in every continent could provide data on $>90\%$ of cycles that were performed in their country (Supplemental Table 1).

Table 1 reports an estimated 1,052,363 treatment cycles from participating clinics, which represented a 10.2% increase in cycles since 2004. The availability of ART varied from 15 and 19 treatment cycles per million inhabitants in the Dominican Republic and Ecuador to 3,982 per million inhabitants in Israel. Japan reported the largest number of aspirations, with 85,859 procedures, followed by the United States and France with 75,859 and 51,413, respectively. On a regional basis, Europe made the largest contribution of aspirations (56%), followed by Asia (23.3%) and North America (15.4%). Frozen embryo transfers represented 28.2% of the initiated cycles (30% in 2004). Globally, ICSI represented 63% of fertilization procedures, an increase from 60.6% in 2004, and varied according to regions. The proportion of ICSI procedures was 64% in Europe, 66.3% in North America, and 81.1% in Latin America.

Effectiveness

Table 2 reports on the outcomes of ART procedures. Pregnancy rates and DRs per aspiration were similar in IVF and ICSI: PR 29.8% vs. 28.9% and DR 20.3% vs. 19.2%, respectively. For FET cycles, the number of transferred embryos, effectiveness, and multiplicity are reported in Supplemental Table 2. Compared with 2004, the DR for FET cycles increased slightly, from 16.6% to 17.4%. The DR per aspiration varied among countries (Supplemental Figs. 1 and 2); and as expected, the cumulative DR per aspiration also varied among