

Assisted reproductive technologies (ART) in Canada: 2009 results from the Canadian ART Register

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Abstract

All 28 Canadian assisted reproductive technology (ART) clinics participated in the Canadian ART Register (CARTR) for 2009. A total of 16,315 cycles was reported to CARTR, resulting in 5621 clinical pregnancies and at least 4448 deliveries, 4412 live births, 3208 singleton live births, 2454 healthy term singletons, 1217 multiple births (including 43 high-order multiple births), and 5710 infants, 43% of whom were from multiple gestations. Birth outcomes were unknown for 141 ongoing pregnancies (3.1%).

In 10,532 IVF/ICSI cycles using the woman's own oocytes, per cycle started, the clinical pregnancy rate was 37.6% (43.3% per embryo transfer), the live birth rate was 30.2%, the singleton live birth rate was 21.5%, and the healthy term singleton rate was 16.4%; the multiple birth rate per delivery was 28.7%, with a high-order multiple birth rate of 1.0%. ICSI was performed in 72% of cycles. One or two embryos were transferred in 71% of cycles. In 486 IVF/ICSI cycles using donor oocytes, per cycle started, the clinical pregnancy rate was 49.6%, the live birth rate was 41.5%, the singleton live birth rate was 28.0%, and the healthy term singleton rate was 18.5%; the multiple birth rate was 32.8%, with a high-order multiple birth rate of 1.5%. In 4223 FET cycles using the woman's own oocytes, per cycle started, the clinical pregnancy rate was 26.4%, the live birth rate was 19.8%, the singleton live birth rate was 15.6%, and the healthy term singleton rate was 12.4%; the multiple birth rate was 20.9%, with a high-order multiple birth rate of 0.7%.

Clinical pregnancy and live birth rates and number of ART cycles performed continued to increase in 2009 compared with previous years. In IVF/ICSI and FET cycles, multiple birth rates were similar to those in 2008 and the high-order multiple birth rates remained at 1% or less.

INTRODUCTION

The Canadian Assisted Reproductive Technologies Register (CARTR) was first established in 1999 for the collection of treatment cycle data from Canadian fertility centres that were using assisted reproductive technologies (ART), including in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), and frozen embryo transfer (FET). The IVF Directors Group of the Canadian Fertility and Andrology Society (CFAS) directs the CARTR programme, which is financially supported by participating ART centres. Participation of ART centres in CARTR is voluntary.

The first report from the Canadian ART Register, describing ART cycles performed in 2001, was published in 2005 (1). Subsequent publications reported on CARTR data from 2002 to 2008 (2-8). This is the ninth annual report of Canadian ART outcomes.

The purpose of this paper is to report on ART cycles performed in Canadian centres in the 2009 calendar year and submitted to CARTR. Trends in outcomes over four years will also be examined.

METHODS

Data Collection

For 2009, 13 centres submitted data to CARTR using the CARTR Treatment Outcome Reporting System (CARTR-TORS; CompuArt Technology, Richmond Hill, Ontario) and 15 centres exported data to CARTR from their own clinic database.

Staff at each centre entered information about patient demographics, diagnosis, and obstetrical history; details of treatment; complications; and pregnancy and birth outcomes for each ART treatment cycle initiated. The completed anonymous case records were sent electronically from each ART centre to the CARTR coordinating centre, where they were manually checked for accuracy and completeness. Corrections or clarifications were requested from the centres as necessary. No on-site data validation from source documents was performed. The records from each centre were then aggregated for data analysis using the computer programme Statistical Package for the Social Sciences (SPSS), version 17 (SPSS Inc., Chicago).

Definitions of Outcomes

The definitions established by the International Committee for Monitoring Assisted Reproductive Technology (ICMART) are followed by CARTR (9). A treatment cycle is considered to have “started” when a woman undergoing ovarian stimulation receives the first dose of gonadotropins or, in a non-stimulated cycle (e.g., for FET), when monitoring is begun. A cancelled cycle is one that is stopped before the oocyte retrieval procedure or thawing of embryos.

Clinical pregnancy includes intrauterine gestation (presence of a gestational sac on

ultrasonography), ectopic pregnancy, and miscarriage diagnosed by histology. Cycles with only a positive pregnancy test (biochemical pregnancy) are not considered to have a clinical pregnancy. Implantation rate is the number of gestational sacs observed on ultrasonography divided by the number of embryos transferred.

Pregnancy loss includes miscarriage and therapeutic abortion of a clinical intrauterine pregnancy occurring at ≤ 20 weeks' gestation. Any pregnancy termination, either spontaneous or therapeutic, occurring after 20 weeks' gestation with no liveborn infant is considered a stillbirth. A delivery is the birth of one or more infants, either living or not, after 20 weeks' gestation. A live birth is a delivery that results in at least one living infant (but, if a multiple birth, may include one or more stillborn infants). A singleton live birth is the delivery of one baby, born alive. A healthy term singleton birth is defined as one baby born alive at term from a singleton pregnancy, with birth weight >2500 g, no birth defect reported, and no neonatal death. A neonatal death is the death of a liveborn infant in the first 28 days of life. A multiple birth is the delivery of more than one infant, either liveborn or stillborn, including deliveries with all infants stillborn. High-order multiple births (triplets or more) are reported separately. A preterm birth is a delivery at <37 weeks of gestation and a very preterm birth is a delivery at <32 weeks.

Statistical Analysis

The statistics used in this report are mainly descriptive, i.e., rates, proportions, means, and medians. The χ^2 test was used occasionally to compare proportions.

Unless otherwise noted, the clinical pregnancy rate is reported per cycle started. Cycle cancellation, ectopic pregnancy, and other complications are reported per cycle started. The miscarriage or pregnancy loss rate is reported per intrauterine pregnancy. Birth rates are reported per cycle started, excluding from both the numerator and the denominator cycles in which the outcome of the clinical pregnancy has not been reported. Because of these missing data, the birth rates reported may underestimate the true birth rates. The multiple birth rate, which includes stillbirths, is reported per delivery.

These data from CARTR for 2009 were presented at the annual IVF Directors' Meetings in September 2010 (pregnancy outcomes) and September 2011 (birth outcomes). A brief summary of the national clinical pregnancy and live birth rates was provided to the media immediately after each meeting. As agreed among all IVF Directors, clinic-specific data are not presented to the public or published.

RESULTS

Participating Centres

All 28 Canadian ART centres operating in 2009 voluntarily contributed to CARTR for that year (listed in the Appendix). Three of the 28 centres performed more than 1000 ART cycles (of all types) in 2009, 11 centres performed between 500 and 1000 cycles, 11 centres performed between 200 and 500 cycles, and three centres performed fewer than 200 cycles.

Overall Outcomes

In total, 16,315 treatment cycles involving ART were reported to CARTR for 2009. Overall, 5621 ART cycles (34.7% of cycles started, excluding 101 embryo and oocyte banking cycles) resulted in a clinical pregnancy, at least 4448 cycles resulted in a delivery (27.7% per cycle started), and at least 4412 cycles resulted in a live birth (27.4% per cycle started). There were 141 cycles with ongoing pregnancies (3.1% of ongoing pregnancies) for which the birth outcome was not reported. Overall, there were at least 1217 multiple births (27.4% of known births): 1174 twin births (26.4% per birth), 41 triplet births (0.9% per birth), and 2 quadruplet births.

A total of 12,325 individual women were treated with ART in 2009: 74% had one treatment cycle, 20% had two cycles, 4% had three cycles and 1% had four or more cycles (up to seven). Overall, 44.8% of women became pregnant in 2009 (with 0.8% having more than one pregnancy) and 35.8% had a live birth.

The various procedures and their success and adverse outcome rates are described in the following sections. The cycle outcomes of the four most common procedures are summarized in Table 1.

IVF/ICSI with Own Oocytes

IVF, including ICSI, using the woman's own oocytes, was the most common procedure performed, with 10,532 cycles reported. Per IVF/ICSI cycle started, the clinical pregnancy rate was 37.6%, the live birth rate was 30.2%, the singleton live birth rate was 21.6%, and the healthy term singleton rate was 16.4%. Donated sperm was used in 4.4% of cycles with oocytes retrieved. There were 69 ectopic pregnancies (0.7% per cycle started), including three heterotopic pregnancies, all of which ended in miscarriage. The pregnancy loss rate was 15.9% of clinical intrauterine pregnancies (miscarriage 15.4%, therapeutic abortion 0.5%). Of the 3177 known births, 28.7% were multiple births (27.7% twins and 1.0% high-order multiples including one set of quadruplets). Included in these figures are 10 pregnancies, four miscarriages, one ectopic, three singleton live births, one twin live birth, and one triplet live birth that resulted from natural conception or intrauterine insemination performed after the IVF/ICSI cycle was cancelled.

Table 1. 2009 cycle outcomes for the four most common types of ART procedures.

Outcome	IVF/ICSI	IVF/ICSI-DO	FET	FET-DO
Cycles started	10,532	486	4223	343
Cancelled cycles (% of cycles started)	871 (8.3)	16 (3.3)	166 (3.9)	8 (2.3)
Oocyte retrievals (% of cycles started)	9661 (91.7)	470 (96.7)	4057 (96.1) ^a	335 (97.7) ^a
Embryo transfers (% of cycles started)	9104 (86.4)	460 (94.7)	3901 (92.4)	333 (97.1)
Clinical pregnancy (% per cycle started) [% per embryo transfer]	3956 (37.6) [43.3]	241 (49.6) [51.3]	1113 (26.4) [28.5]	113 (32.9) [33.9]
Ectopic pregnancy (% per cycle started)	69 (0.7)	2 (0.4)	20 (0.5)	2 (0.6)
Miscarriage (% per IU pregnancy)	598 (15.4)	34 (14.2)	227 (20.7)	26 (23.4)
Therapeutic abortion (% per IU pregnancy)	19 (0.5)	1 (0.4)	3 (0.3)	1 (0.9)
Delivery ^b (% per cycle started)	3177 (30.4)	201 (41.7)	836 (19.9)	81 (23.8)
Live birth ^b (% per cycle started) [% per embryo transfer]	3149 (30.2) [34.9]	200 (41.5) [43.9]	830 (19.8) [21.4]	80 (23.5) [24.2]
Singleton live birth ^b (% per cycle started)	2249 (21.6)	135 (28.0)	656 (15.6)	59 (17.4)
Healthy term singleton ^b (% per cycle started)	1715 (16.4)	89 (18.5)	520 (12.4)	40 (11.8)
Singleton delivery ^b (% of deliveries)	2265 (71.3)	135 (67.2)	661 (79.1)	60 (74.1)
Twin delivery ^b (% of deliveries)	880 (27.7)	63 (31.3)	169 (20.2)	20 (24.7)
Triplet or more delivery ^b (% of deliveries)	31 (1.0)	3 (1.5)	6 (0.7)	1 (1.2)

^a Cycles with embryos thawed.

^b Cycles with unknown delivery status omitted: 96 IVF/ICSI, 4 IVF/ICSI-DO, 30 FET, 3 FET-DO

Rates for IVF and ICSI separately can only be provided per successful retrieval (i.e., one or more oocytes retrieved) because the decision to use ICSI might not be made until the sperm and oocytes are assessed in the embryology laboratory (Table 2). Of 9629 IVF/ICSI cycles with a successful retrieval, 27.8% had insemination by standard IVF (including 43 cycles with failed fertilization that had ICSI performed the next day [rescue ICSI]), 67.3% by ICSI, and 4.5% by IVF/ICSI split (some oocytes inseminated by each method). The clinical pregnancy rates per successful retrieval were 41.8% for standard IVF (30.2% for the rescue ICSI cycles), 40.4% for ICSI, and 46.7% for IVF/ICSI split. Including the IVF/ICSI split cycles in the ICSI group, the clinical pregnancy rates per retrieval were 41.8% for IVF and 40.8% for ICSI, and the live birth rates per retrieval were 34.2% and 32.7%, respectively. The ectopic pregnancy rate per retrieval was 0.8% with IVF and 0.7% with ICSI, and the pregnancy loss rates per intrauterine pregnancy were 14.8% (miscarriage 14.3%, therapeutic abortion 0.5%) and 16.2% (miscarriage 15.7%, therapeutic abortion 0.5%), respectively. Of 916 known births after IVF, 30.8% were multiple births (29.8% twins and 1.0% triplets); of 2256 known births after ICSI, 27.8% were multiple births (26.9% twins and 0.9% triplets).

Table 2. 2009 clinical pregnancy and birth outcomes by type of insemination method in IVF/ICSI cycles with successful retrieval.

Insemination method	No. of cycles (% of all retrieval cycles)^a	No. of pregnancies (% per retrieval)	No. of singleton live births (% per retrieval)^b	No. of multiple births (% per birth)^b	No. of triplet births (% per birth)^b
IVF	2684 (27.8)	1123 (41.8)	629 (23.4)	282 (30.8)	9 (1.0)
IVF/ICSI split	430 (4.5)	201 (46.7)	108 (25.1)	50 (31.6)	1 (0.6)
ICSI	6484 (67.3)	2622 (40.4)	1509 (23.3)	577 (27.5)	20 (1.0)

^a 29 cycles that did not have insemination and 2 cycles that had ICSI on day 1 omitted.

^b 96 cycles with unknown delivery status omitted.

IVF/ICSI with Oocyte Donation

IVF/ICSI using donor oocytes (IVF/ICSI-DO) was reported in 486 cycles in 2009. In IVF/ICSI-DO cycles, per cycle started, the clinical pregnancy rate was 49.6%, the live birth rate was 41.5%, the singleton live birth rate was 28.0%, and the healthy term singleton rate was 18.5%. Donated sperm was used in 9.4% of cycles with oocytes donated. There were two ectopic pregnancies (0.4% per cycle started), including one heterotopic pregnancy that ended in miscarriage. The pregnancy loss rate was 14.6% per intrauterine pregnancy (miscarriage 14.2%, therapeutic abortion 0.4%). Of 201 known births, 32.8% were multiple births (31.3% twins, 1.5% triplets).

Of 468 cycles with a successful retrieval, 21.8% had insemination by standard IVF (including 1 cycle that used rescue ICSI), 69.9% by ICSI, and 7.9% by IVF/ICSI split. The clinical pregnancy rates per successful retrieval were 48.0%, 53.2%, and 48.6%, respectively.

Information about the oocyte donor's age was available for all but 2 cycles. Donor age was <30 years in 62% of cycles, 30-34 years in 24%, 35-39 years in 12%, and ≥40 years in 2.5%. The clinical pregnancy rates per cycle started were 50.7%, 51.3%, 43.9%, and 41.7%, respectively.

FET with Own Oocytes

In 2009, 4223 cycles of FET, using cryopreserved embryos created from the woman's own oocytes, were reported. Per cycle started, the clinical pregnancy rate was 26.4%, the live birth rate was 19.8%, the singleton live birth rate was 15.6%, and the healthy term singleton rate was 12.4%. There were 20 ectopic pregnancies (0.5% per cycle started), including three heterotopic pregnancies that resulted in one miscarriage and two singleton live births. The pregnancy loss rate was 21.0% per intrauterine pregnancy (miscarriage 20.7%, therapeutic abortion 0.3%). Of 836 known births, 20.9% were multiple births (20.2% twins and 0.7% high-order multiples including one set of quadruplets).

FET with Oocyte or Embryo Donation

The category FET-DO includes transfer of cryopreserved embryos created from donor oocytes in a previous IVF/ICSI-DO cycle (310 cycles) and cryopreserved donated embryos (33 cycles). In this category, per cycle started, the clinical pregnancy rate was 32.9%, the live birth rate was 23.5%, the singleton live birth rate was 17.4%, and the healthy term singleton rate was 11.8%. There were two ectopic pregnancies (0.6% per cycle started). The pregnancy loss rate was 24.3% per intrauterine pregnancy (miscarriage 23.4%, therapeutic abortion 0.9%). Of 81 known births, 25.9% were multiple births (24.7% twins, 1.2% triplets).

Information about the oocyte donor's age was available for 98% of cycles. Donor age was <30 years in 59% of cycles, 30-34 years in 31%, 35-39 years in 9%, and ≥40 years in 1%. The clinical pregnancy rates per cycle started were 30.2%, 39.4%, 27.6%, and 33.3%, respectively.

Gestational Carrier Cycles

There were 272 cycles in which embryos were transferred into the uterus of a woman other than the one who intended to raise the child. Gestational carriers were used in 85 IVF/ICSI and 83 FET cycles with the parenting woman's own oocytes, 46 IVF/ICSI and 53 FET cycles with donated oocytes, and five cycles using other types of ART. Use of donated sperm was reported for seven cycles (5.5% of fresh cycles with oocytes retrieved).

In fresh embryo cycles using a gestational carrier, per cycle started, the clinical pregnancy rate was 44.9% and the live birth rate was 34.3%; in frozen embryo cycles, the rates were 30.1% and 24.4%, respectively. Of the 102 clinical intrauterine pregnancies in gestational carriers, 6.6% ended in miscarriage; there was one therapeutic abortion and one ectopic pregnancy. Of 79 known births, 39.2% were multiple births (36.7% twins, 2.5% triplets).

Other Cycle Types

Several other types of ART procedures that did not fit into the categories previously described were reported to CARTR for 2009. Natural (unstimulated) IVF was performed in 180 cycles, with clinical pregnancy rates of 14.4% per cycle started and 34.2% per embryo transfer (ET), and live birth rates of 12.8% and 30.3%, respectively; there was no multiple birth. Eighteen cycles were reported in which oocyte retrieval was performed for the sole purpose of freezing oocytes. In 24 cycles, previously frozen oocytes were thawed and inseminated, with a clinical pregnancy rate per cycle started of 16.7% and a live birth rate per cycle started of 12.5%; of three births, one was twins (33.3%). Sixty-one cycles of in vitro oocyte maturation were reported, with a clinical pregnancy rate per cycle started of 54.1% and a live birth rate per cycle started of 35.6%; of 21 births, three were twins (14.3%). Eighty-three cycles were performed for the purpose of embryo banking, with oocyte freezing also done in two cycles. One cycle using fresh donor embryos resulted in a singleton live birth. Twenty-two cycles classified as “other”, including 18 research cycles and four cycles of mixed ART types, resulted in six pregnancies and six singleton live births.

Preimplantation genetic diagnosis (PGD) was performed in 67 cycles using fresh embryos and three cycles using frozen embryos, resulting in 26 pregnancies and 20 live births (11 singleton and 9 twin births). In addition, preimplantation genetic screening (PGS) for aneuploidy was reported for 60 IVF/ICSI cycles, three FET cycles, five IVF/ICSI-DO cycles, two in vitro maturation cycles, one cycle using frozen oocytes, and two gestational carrier cycles, resulting in 26 pregnancies and 20 live births (11 singleton and 9 twin births).

Birth Outcomes for All ART Procedures

At least 4448 deliveries resulted in at least 5710 infants born from all types of ART cycles started in 2009 in Canada: 3231 infants from 3231 singleton births (56.6% of infants), 2348 infants from 1174 twin births (41.1%), 123 infants from 41 triplet births (2.2%), and 8 infants from 2 quadruplet births (0.1%). Thus, 43% of infants were born from multiple gestations. An additional 141 pregnancies had no delivery information reported. Of these pregnancies, 103 had one viable fetus and 36 had two viable fetuses at last report; thus, as many as 175 additional babies may have been born.

Of the 3231 infants born as singletons, there were 23 stillbirths and 7 neonatal deaths, a total perinatal mortality rate of 0.9% per infant. The median gestational age at birth was 39 weeks (range, 22-44 wk) for liveborn infants and 24 weeks (range, 20-41 wk) for stillborn infants. Preterm delivery (<37 weeks) occurred in 15.2% of births and very preterm delivery (<32 weeks) in 2.4% of births. Birth weight was normal (>2500 g) for 90.2% of liveborn singletons, low (1500-2500 g) for 8.6%, and very low (<1500 g) for 1.2%. Some type of birth defect was reported for 59 infants (1.8% of infants).

Of the 2348 infants born as twins, there were 31 stillbirths and 22 neonatal deaths, a total perinatal mortality rate of 2.3% per infant. The median gestational age at birth was 36 weeks (range, 20-41 wk) for live births and 21 weeks (range, 20-29 wk) for stillbirths. Preterm delivery occurred in 67.3% of births and very preterm delivery in 11.1% of births. Birth weight was

>2500 g for 46.7% of liveborn twins, 1500-2500 g for 46.3%, and <1500 g for 7.1%. Some type of birth defect was reported for 35 infants (1.5% of infants).

Of the 131 infants born as triplets or quadruplets, there were three stillbirths and five neonatal deaths, a total perinatal mortality rate of 6.1% per infant. The gestational age at birth was median 33 weeks (range, 25-36 wk) for triplet live births, 28 weeks for quadruplet live births (range, 27-29 wk), and 22 weeks for the one triplet stillbirth. Preterm delivery occurred in 100% of births and very preterm delivery in 42.9% of births. Birth weight was >2500 g for 12.9% of liveborn infants, 1500-2500 g for 60.3%, and <1500 g for 26.7%. Some type of birth defect was reported for four infants (3.1% of infants).

Results for deliveries by multiplicity are summarized in Table 3 and for infants by multiplicity in Table 4.

Table 3. 2009 birth outcomes per delivery by multiplicity.

Multiplicity	Deliveries, n (%)	Live birth, n (%)	Median gestational age at live birth (wks) ^a	Preterm birth, n (%) ^a	
				<37 weeks	<32 weeks
Singleton	3231 (72.6)	3208 (99.3)	38.9	489 (15.2)	77 (2.4)
Twins	1174 (26.4)	1162 (99.0)	36.3	789 (67.3)	130 (11.1)
Triplets	41 (0.9)	40 (97.6)	32.9	40 (100)	16 (40.0)
Quads	2 (0.04)	2 (100)	28.4	2 (100)	2 (100)

^a Gestational age missing for 9 births.

Table 4. 2009 infant outcomes by multiplicity.

Multiplicity	Infants, n (%)	Stillborn/neonatal death, n/n (% perinatal death)	Birth weight, live births, n (%) ^a			Birth defect, n (%)
			>2500 g	1500-2500 g	<1500 g	
Singleton	3231 (56.6)	23/7 (0.9)	2632 (90.2)	250 (8.6)	36 (1.2)	59 (1.8)
Twins	2348 (41.1)	31/22 (2.3)	978 (46.7)	969 (46.3)	148 (7.1)	35 (1.5)
Triplets	123 (2.2)	3/5 (6.5)	15 (13.9)	70 (64.8)	23 (21.3)	4 (3.3)
Quads	8 (0.14)	0/0	0	0	8 (100)	0

^a Birth weight missing for 524 live born infants.

Information on sex of the infant was available for 98% of babies: 50.2% were male and 49.8% were female.

The information provided on birth defects was limited. Overall, some type of birth defect was reported for 98 infants (1.7% of infants): 29 cases of cardiac defect (two stillbirths and two neonatal deaths), seven cases of chromosome aneuploidy (one stillbirth), five cases of gastrointestinal defect (one stillbirth), two cases of limb defect, seven cases of urogenital defect, four cases of metabolic disorder, and 44 cases of other unspecified defects (three stillbirths and three neonatal deaths).

Of 1546 multiple pregnancies, 41 were reported to be monochorionic: 1.6% of twin pregnancies and 16.4% of high-order pregnancies. Miscarriage was more likely to occur in monochorionic multiple pregnancies (7.3% vs. 4.7%), but the rate of pregnancy reduction was similar (17%). In multiple pregnancies that resulted in a birth, monochorionic multiple pregnancies were more likely to result in a multiple birth (95% vs. 85%), but perinatal death rates were similar (2.7% vs. 3.2%). Stratified by number of babies born, monochorionic multiple pregnancies were not more likely to result in preterm birth <37 weeks, but triplets born from monochorionic pregnancies were more likely to be born very preterm <32 weeks (73% of 11 births) than other triplets (28% of 29 births).

The risk of a couple experiencing perinatal death was related to multiple birth. Perinatal death of one or more infants occurred in 0.9% of singleton deliveries, 3.1% of twin deliveries, and 11.6% of triplet or quadruplet deliveries (risk ratio, 3.6, 95% confidence interval, 2.3 to 5.8; $P<0.0001$, multiple vs. singleton). The risk of perinatal death of all infants was 0.9%, 1.5%, and 2.3%, respectively ($P=0.07$, multiple vs. singleton).

Effect of Female Age

The clinical pregnancy and birth outcomes for women categorized into three age groups are given in Table 5. The mean female age was 35 years in IVF/ICSI and FET cycles and 41 years in DO cycles. The proportion of cycles in women aged 40 years and older was 19% in IVF/ICSI cycles, 14% in FET cycles, and 67% in DO cycles. In IVF/ICSI and FET cycles, the clinical pregnancy and live birth rates declined with female age, especially after age 40 years. In DO cycles, clinical pregnancy and live birth rates increased with female age. The multiple birth rates declined with age in IVF/ICSI cycles; in FET and DO cycles, age had no clear effect on multiple births.

In IVF/ICSI cycles using the woman's own oocytes, the age-related decline in ART success can be attributed to suboptimal outcomes at several steps in the process. The proportion of started cycles with successful retrieval decreased with age (94.4% for women aged <35 years, 90.8% for those aged 35-39 years, and 86.4% for those aged ≥ 40 years), as did the mean number of oocytes retrieved (13.3, 11.1, and 9.3, respectively). In women who had one or more embryos replaced, the mean implantation rate per embryo transferred declined with increasing female age (37.3%, 25.9%, and 11.4%), as did the clinical pregnancy rate per ET (52.0%, 42.7%, and 24.2%), even though older women had more embryos transferred (mean, 2.0, 2.3, and 2.8). The proportion of women having ET who had surplus embryos available for cryopreservation gradually decreased from the younger to older women (59.2%, 42.2%, and 20.0%).

In women who achieved clinical intrauterine pregnancy, the pregnancy loss rate per intrauterine pregnancy became higher as women aged (10.9%, 17.9%, and 37.1%). The risks of adverse birth outcomes, such as preterm birth and perinatal death, increased with advanced female age in singleton births, but not in multiple births.

Table 5. 2009 clinical pregnancy and birth outcomes by female age for the three most common ART procedures.

Outcome/female age group	IVF/ICSI	IVF/ICSI -DO	FET
Mean female age, years (range)	35 (20-49)	41 (24-55)	35 (20-51)
Cycles started, n (% of cycles within procedure)			
<35	4392 (41.7)	61 (12.6)	1957 (46.3)
35-39	4118 (39.1)	98 (20.2)	1695 (40.1)
≥40	2022 (19.2)	327 (67.3)	571 (13.5)
Clinical pregnancy, n (% per cycle started) [% per ET]			
<35	2042 (46.5) [52.0]	27 (44.3) [47.4]	568 (29.0) [31.7]
35-39	1514 (36.8) [42.7]	47 (48.0) [52.2]	444 (26.2) [28.1]
≥40	400 (19.8) [24.2]	167 (51.1) [53.4]	101 (17.7) [19.2]
Pregnancy loss, n (% per intrauterine pregnancy)			
<35	214 (10.9)	3 (11.1)	99 (18.4)
35-39	260 (17.9)	8 (17.4)	107 (24.8)
≥40	143 (37.1)	24 (14.7)	24 (25.0)
Live birth, n (% per cycle started) [% per ET] ^a			
<35	1732 (39.9) [44.7]	23 (37.7) [40.4]	437 (22.5) [24.6]
35-39	1180 (28.9) [33.6]	38 (39.2) [42.7]	323 (19.2) [20.5]
≥40	237 (11.8) [14.4]	139 (42.9) [44.8]	70 (12.3) [13.4]
Singleton live birth, n (% per cycle started) ^a			
<35	1172 (27.0)	14 (23.0)	349 (18.0)
35-39	876 (21.4)	28 (28.9)	249 (14.8)
≥40	201 (10.0)	93 (28.7)	58 (10.2)
Healthy term singleton, n (% per cycle started) ^a			
<35	906 (20.9)	9 (14.8)	282 (14.5)
35-39	659 (16.1)	19 (19.6)	196 (11.6)
≥40	150 (7.4)	61 (18.8)	42 (7.4)
Multiple birth, n (% per delivery) ^a			
<35	569 (32.6)	10 (41.7)	89 (20.2)
35-39	305 (25.6)	10 (26.3)	74 (22.8)
≥40	37 (15.3)	46 (33.1)	12 (16.7)

^a130 cycles with unknown delivery status omitted.

Effect of Infertility Diagnosis

In IVF/ICSI cycles, the reason for ART treatment was most commonly male factor infertility (30% of cycles) or a single female infertility factor (29%). Idiopathic or unexplained infertility was the diagnosis in 20% of cycles. Both female and male infertility factors were diagnosed in 16% of cycles and more than one female factor in 5%. Mean female age, use of ICSI, and the clinical pregnancy rate per cycle started varied across diagnostic categories (Table 6).

Pregnancy rate per cycle started was highest when male factor infertility was the only diagnosis (43.6%). Couples with idiopathic infertility had a clinical pregnancy rate of 39.7%. In couples with a single female infertility factor, the clinical pregnancy rate varied from 40.1% with ovulatory disorder to 26.1% with diminished ovarian reserve. Pregnancy rate was reduced in the presence of both female and male infertility factors (33.0%) or multiple female infertility factors without male factor (30.2%). These differences across diagnostic groups were statistically significant ($P < 0.001$).

Table 6. 2009 clinical pregnancy and birth outcomes by infertility diagnosis category in IVF/ICSI cycles.^a

Diagnostic Category	No. of cycles (% of all IVF/ICSI cycles)	Mean female age (years)	Proportion of cycles ^c using ICSI (%)	No. of pregnancies (% per cycle started)	No. of live births (% per cycle started) ^d
Idiopathic	2063 (19.8)	35.8	55	819 (39.7)	661 (32.4)
Male factor only	3112 (29.9)	34.3	96	1356 (43.6)	1107 (36.0)
Male + female factor	1640 (15.8)	35.8	91	541 (33.0)	427 (26.2)
Tubal factor only	965 (9.3)	35.5	38	326 (33.8)	261 (27.2)
Endometriosis only	566 (5.4)	34.5	55	212 (37.5)	171 (30.4)
Ovulatory disorder only ^b	549 (5.3)	34.2	54	220 (40.1)	175 (32.2)
Other female factor only	486 (4.7)	37.7	62	143 (29.4)	94 (19.6)
Diminished ovarian reserve only	498 (4.8)	38.5	75	130 (26.1)	90 (18.2)
>1 female factor	533 (5.1)	36.4	48	161 (30.2)	126 (23.7)

^a 120 cycles with unknown diagnosis omitted. Categories are mutually exclusive.

^b Including polycystic ovarian syndrome.

^c Cycles with insemination done.

^d 94 cycles with unknown delivery status omitted.

Effect of Number of Embryos Transferred

The number of embryos transferred in IVF/ICSI cycles ranged from one to nine with a mean of 2.3. A single embryo was transferred in 13% of transfer cycles. More commonly, either two (58% of cycles) or three (22% of cycles) embryos were transferred. More embryos were transferred in older women: the mean age of women receiving four or more embryos (7% of cycles) was 40 years, compared with 37 years for those receiving three embryos and 34 years for those receiving two embryos.

Overall, the clinical pregnancy rate was 43.3% per ET. Clinical pregnancy and birth outcomes by number of embryos transferred are shown in Table 7. The clinical pregnancy rate was low when only one embryo was transferred (33.2% per ET). Transferring three or more embryos did not increase the clinical pregnancy rate beyond the high level observed with two embryos (47.9% per ET); indeed, the clinical pregnancy rate declined to 41.4% per ET with three embryos and 31.7% per ET with four or more embryos. The mean implantation rate per embryo transferred was highest when 1 or 2 embryos were transferred: 32.5% with one embryo, 32.7% with two embryos, 19.5% with three embryos, and 10.7% with four or more embryos.

Table 7. 2009 clinical pregnancy and birth outcomes by number of embryos transferred in IVF/ICSI cycles.

No. of embryos transferred	No. of cycles (% of all ET cycles)	No. of pregnancies (% per ET)	No. of singleton live births (% per ET) ^a	No. of multiple births (% per birth) ^a	No. of high-order multiple births (% per birth) ^a
1	1207 (13.3)	401 (33.2)	324 (27.1)	6 (1.8)	0
2	5256 (57.7)	2519 (47.9)	1379 (26.6)	697 (33.4)	14 (0.7)
3	1961 (21.5)	811 (41.4)	432 (22.2)	172 (28.2)	14 (2.3)
4 or more	679 (7.5)	215 (31.7)	111 (16.5)	34 (23.1)	2 (1.4)

^a 96 cycles with unknown delivery status omitted.

Thirty-one percent of two-embryo transfers were performed on day 5 after oocyte retrieval and 64% on day 3. Clinical pregnancy rates per ET were higher with day 5 transfer (52.0%) than with day 3 transfer (46.9%). In contrast, only 12% of three-embryo transfers and 6% of ≥four-embryo transfers were performed on day 5.

Although IVF/ICSI cycles with only one embryo transferred had a clinical pregnancy rate lower than that of cycles with two embryos transferred, the singleton live birth rates were about the same (27.1% vs 26.6% per ET). The multiple birth rate per known birth was higher with two embryos (33.4%) than with three or more embryos (27.2%) (Table 7). The high-order multiple birth rate was 2.1% when three or more embryos were transferred. Of note, 77% of multiple births and 47% of high-order multiple births (including one quadruplet birth) in IVF/ICSI cycles resulted from cycles with only two embryos transferred.

When the effect of number of embryos transferred was examined by female age group, different patterns emerged, for both the distribution of number of embryos transferred and the

resulting clinical pregnancy, singleton live birth, and multiple birth rates (Table 8). A majority of multiple births (55%) and 43% of high-order multiple births in IVF/ICSI cycles occurred in women aged <35 years who had two embryos transferred.

Table 8. 2009 clinical pregnancy and birth outcomes by female age and number of embryos transferred in IVF/ICSI cycles.

Female age group (years)	No. of embryos transferred	No. of cycles (% within age group)	No. of pregnancies (% per ET)	No. of singleton live births (% per ET) ^a	No. of multiple births (% per birth) ^a
<35	1 ^b	592 (15.1)	268 (45.3)	224 (38.3)	6 (2.6)
	2	2876 (73.3)	1553 (54.0)	841 (29.7)	497 (37.1)
	3	403 (10.3)	198 (49.1)	97 (24.3)	62 (38.8)
	4 or more	51 (1.3)	19 (37.3)	10 (20.0)	3 (23.1)
35-39	1 ^b	403 (11.4)	106 (26.3)	82 (20.4)	0
	2	1894 (53.5)	843 (44.5)	475 (25.4)	190 (28.3)
	3	1038 (29.3)	481 (46.3)	274 (26.6)	98 (26.2)
	4 or more	203 (5.7)	80 (39.4)	43 (21.3)	16 (26.7)
≥40	1 ^b	212 (12.9)	27 (12.7)	18 (8.6)	0
	2	486 (29.6)	123 (25.3)	63 (13.0)	10 (13.7)
	3	520 (31.6)	132 (25.4)	61 (11.8)	12 (15.8)
	4 or more	425 (25.9)	116 (27.3)	58 (13.7)	15 (20.3)

^a 96 cycles with unknown delivery status omitted.

^b Proportion of one-embryo transfers that were elective single embryo (eSET): 63% in <35, 32% in 35-39, and 3% in ≥40.

In FET cycles, the number of thawed embryos transferred ranged from one to nine, with a mean of 2.1. A single embryo was transferred in 23% of cycles, two embryos in 51%, three embryos in 21%, and four or more embryos in 6%. Overall, the clinical pregnancy rate was 28.5% per ET. Clinical pregnancy and birth outcomes by number of embryos transferred are shown in Table 9. In FET cycles, clinical pregnancy rate per ET was lowest when one embryo was transferred (19.1%) and highest when three or more embryos were transferred (32.4%). Mean implantation rate per embryo transferred was highest when one (19.0%) or two (18.8%) embryos were transferred, compared with 14.7% with three embryos, and 11.7% with four or more embryos. The singleton live birth rate was highest when two embryos were transferred.

The multiple birth rate per known birth increased with number of thawed embryos transferred: 2.4% with one embryo, 20.9% with two embryos, and 30.6% with three or more embryos. The high-order multiple birth rate was 2.1% when three or more embryos were transferred. Of six high-order multiple births in FET cycles, one triplet birth resulted when two embryos were transferred and one quadruplet birth resulted when three embryos were transferred.

Table 9. 2009 clinical pregnancy and birth outcomes by number of embryos transferred in FET cycles.

No. of embryos transferred	No. of cycles (% of all FET cycles)	No. of pregnancies (% per ET)	No. of singleton live births (% per ET) ^a	No. of multiple births (% per birth) ^a	No. of triplet or more births (% per birth) ^a
1	888 (22.8)	170 (19.1)	122 (13.9)	3 (2.4)	0
2	1983 (50.8)	609 (30.7)	367 (18.7)	98 (20.9)	1 (0.2)
3	809 (20.7)	263 (32.5)	130 (16.1)	58 (30.7)	5 (2.6)
4 or more	221 (5.7)	71 (32.1)	37 (16.7)	16 (30.2)	0

^a 30 cycles with unknown delivery status omitted.

Effect of Day of Embryo Transfer

In IVF/ICSI cycles, ET was performed on day 2 (after oocyte retrieval) in 6% of transfers, day 3 in 67%, and day 5 in 26%. The mean female age was 36.0 years for transfers done on day 2, 34.0 years on day 3, and 33.6 years on day 5. More embryos were transferred to each woman on day 2 and day 3 (mean, 2.5 and 2.4) than on day 5 (mean, 1.9). The proportion of cycles with one or two embryos transferred was 54% on day 2, 66% on day 3, and 88% on day 5. Only 4% of transfers done on day 2 had surplus embryos available (which allows the best embryos to be selected for transfer), compared with 55% of day 3 transfers and 71% of day 5 transfers. Table 10 shows results by day of embryo transfer.

Clinical pregnancy rate per ET was higher for transfers done on day 5 (50.4%) than for transfers done on day 3 (41.9%) or day 2 (30.1%), as was multiple birth rate (31.1%, 28.2%, and 19.3%, respectively). The mean implantation rates per embryo transferred were 15.8% on day 2, 25.7% on day 3, 19.7% on day 4, 37.5% on day 5, and 38.6% on day 6/7.

Table 10. 2009 clinical pregnancy and birth outcomes by day of embryo transfer in IVF/ICSI cycles.

Day of embryo transfer	No. of cycles (% of all ET cycles) ^a	No. of pregnancies (% per ET)	No. of singleton live births (% per ET) ^b	No. of multiple births (% per birth) ^b	No. of high-order multiple births (% per birth) ^b
2	538 (5.9)	162 (30.1)	91 (17.1)	22 (19.3)	0
3	6057 (66.6)	2537 (41.9)	1460 (24.3)	577 (28.2)	21 (1.0)
4	87 (1.0)	29 (33.3)	20 (23.0)	6 (23.1)	0
5	2382 (26.2)	1201 (50.4)	664 (28.3)	301 (31.1)	9 (0.9)
6 or 7	35 (0.4)	16 (45.7)	10 (28.6)	3 (23.1)	0

^a 4 cycles missing ET day and 1 cycle with ET on day 1 omitted.

^b 96 cycles with unknown delivery status omitted.

Table 11 shows clinical pregnancy rates and birth outcomes for ET days 2, 3, and 5 by number of embryos transferred. These rates are confounded by both female age and the availability of surplus embryos.

Table 11. 2009 clinical pregnancy and birth outcomes by ET day and number of embryos transferred in IVF/ICSI cycles.

ET day	No. of embryos transferred	Mean female age (years)	Surplus embryos available (% of ETs)	No. of cycles (% within ET day)	No. of pregnancies (% per ET)	No. of singleton live births (% per ET) ^a	No. of multiple births (% per birth) ^a
2	1	35.9	0	112 (20.8)	15 (13.4)	9 (8.2)	0
	2	34.9	12	178 (33.1)	58 (32.6)	34 (19.1)	8 (19.0)
	3	36.2	0	155 (28.8)	54 (34.8)	31 (20.1)	9 (22.0)
	4 or more	38.0	0	93 (17.3)	35 (37.6)	17 (19.1)	5 (22.7)
3	1	34.3	28	602 (9.9)	138 (22.9)	109 (18.3)	0
	2	32.7	65	3384 (55.9)	1587 (46.9)	913 (27.3)	415 (31.1)
	3	36.2	40	1535 (25.3)	646 (42.1)	353 (23.2)	135 (27.4)
	4 or more	38.8	25	536 (8.8)	166 (31.0)	85 (15.9)	27 (23.7)
5	1	32.2	94	466 (19.6)	237 (50.9)	196 (42.2)	6 (3.0)
	2	33.5	68	1639 (68.8)	852 (52.0)	419 (26.1)	268 (38.9)
	3	37.7	41	236 (9.9)	100 (42.4)	42 (17.9)	25 (36.8)
	4 or more	38.4	22	41 (1.7)	12 (29.3)	7 (17.1)	2 (22.2)

^a 96 cycles with unknown delivery status omitted.

Effect of Surplus Embryos

The clinical pregnancy rate per ET was 34.6% when all available embryos were transferred (54% of transfers, mean female age 36.4 years) and 53.8% when surplus embryos were available (46% of transfers, mean female age 33.9 years). The mean implantation rates per embryo transferred were 20.1% and 37.9%, respectively. Surplus embryos were available in 59% of transfer cycles in women aged <35 years, 42% of cycles in women 35-39 years, and 20% of cycles in women ≥40 years.

In Canada in 2009, a single embryo was transferred by choice (elective SET or eSET) in 510 IVF/ICSI cycles (42% of single ETs and 5.6% of all transfer cycles). The clinical pregnancy rate per ET was 52.5% in eSETs, compared with 19.4% when only one embryo was available. Some of this difference can be explained by female age, as 74% of eSETs were performed in women <35 years and only 1.4% in women ≥40 years. Looking at it another way, when a single embryo was transferred, it was eSET in 63% of women <35 years and 32% of women 35-39 years, but only 3% of women ≥40 years. The clinical pregnancy rate per ET was 35.4% when eSET was done on day 3 (22% of transfers) and 57.7% when it was done on day 5 (75% of transfers).

Double embryo transfer (two embryos) was performed by choice (elective DET or eDET)

in 2911 IVF/ICSI cycles (55% of double ETs and 32% of all transfer cycles). In these cycles, the clinical pregnancy rate per ET was 55.5%, compared with 38.4% when only two embryos were available. Again, female age was a factor in this result: 62% of eDETs were performed in women <35 years and only 4% in women \geq 40 years. When two embryos were transferred, it was eDET in 63% of women <35 years and 52% of women 35-39 years, but only 26% of women \geq 40 years. The clinical pregnancy rate per ET was 53.7% when eDET was done on day 3 (65% of transfers) and 59.2% when it was done on day 5 (34% of transfers). The multiple birth rate per known birth was 36.8% with eDET and 27.3% when only two embryos were available.

Results for elective and non-elective SET and DET by female age group are shown in Table 12. In women aged <35 years, the clinical pregnancy rate per ET was only slightly lower with eSET (56.5%) than with eDET (58.4%), but the singleton live birth rate per ET was much higher (48.0% vs 30.9%) because of a multiple birth rate of 39.5% in the eDET group. In the two older age groups, despite careful patient selection, clinical pregnancy rates with eSET were about 10 percentage points lower than those with eDET. However, for women aged 35-39 years, the singleton live birth rate was higher with eSET than with eDET (32.8% vs 28.5%).

Table 12. 2009 clinical pregnancy and birth outcomes by female age in elective and non-elective single and double embryo transfer IVF/ICSI cycles.

Female age group (years)	Type of embryo transfer ^a	No. of cycles (% within age group)	No. of pregnancies (% per ET)	No. of singleton live births (% per ET) ^b	No. of multiple births (% per birth) ^b
<35	eSET	375 (9.6)	212 (56.5)	178 (48.0)	6 (3.2)
	neSET	217 (5.5)	56 (25.8)	47 (21.9)	0
	eDET	1807 (46.1)	1055 (58.4)	549 (30.9)	358 (39.5)
	neDET	1069 (27.2)	498 (46.6)	291 (27.5)	139 (32.2)
35-39	eSET	128 (3.6)	54 (42.2)	42 (32.8)	0
	neSET	275 (7.8)	52 (18.9)	41 (15.0)	0
	eDET	977 (27.6)	512 (52.4)	274 (28.5)	134 (32.4)
	neDET	917 (25.9)	331 (36.1)	200 (22.1)	56 (21.8)
\geq 40	eSET	7 (0.4)	2 (28.6)	1 (14.3)	0
	neSET	205 (12.5)	25 (12.2)	17 (8.4)	0
	eDET	127 (7.7)	50 (39.4)	25 (19.7)	4 (13.8)
	neDET	359 (21.9)	73 (20.3)	38 (10.6)	6 (13.6)

^a eSET, eDET = elective single or double embryo transfer (surplus embryos available); neSET, neDET = non-elective single or double embryo transfer (all available embryos were transferred).

^b 77 cycles with unknown delivery status omitted.

Complications and Fetal Reduction

Complications were reported in 202 IVF/ICSI cycles (1.9% per cycle started). There were 114 cases of moderate ovarian hyperstimulation syndrome (1.1% per cycle started), 13 of which (11%) required hospitalization, and 45 cases of severe ovarian hyperstimulation syndrome (0.4% per cycle started), 32 of which (71%) required hospitalization. Also reported were 24 complications related to medications, two complications related to procedures (one hospitalization), one case of infection (hospitalized), and 16 other unspecified complications (one hospitalization). No maternal death was reported.

Of 1546 multiple pregnancies from all types of ART cycles, outcomes were known for 1510 multiple pregnancies. Of these, 263 (17.4%) had fetal reduction (loss of one or more, but not all fetuses) following ultrasonographic confirmation of fetal viability at 6-8 weeks' gestation; the reduction was spontaneous in 218 cases (83%) and therapeutic in 45 cases (17%). Of 1400 pregnancies that were originally twins, reduction to one fetus occurred spontaneously in 13.2% and therapeutically in 1.4%, and loss of the whole pregnancy occurred in 4.6%, including four therapeutic abortions; 81% of viable twin gestations resulted in a twin birth. Of 104 pregnancies that were originally triplets, reduction to two fetuses occurred spontaneously in 21.2% and therapeutically in 17.3%; reduction to one fetus occurred spontaneously in 9.6% and therapeutically in 1.0%; and loss of the whole pregnancy occurred in 11.5%, including three miscarriages after therapeutic reduction was performed. Thus, only 39% of viable triplet pregnancies resulted in a triplet birth. Of six pregnancies that originally had four viable fetuses, one was spontaneously reduced to two fetuses, two were therapeutically reduced to two fetuses, one miscarried after therapeutic reduction was performed, and two resulted in a quadruplet birth.

Trends over Time

Table 13 compares the major outcomes from CARTR over a 4-year period (2006-2009) for IVF/ICSI, FET, and IVF/ICSI-DO cycles. Continuing increases were seen in the number of cycles submitted to CARTR, the proportion of IVF/ICSI cycles using ICSI, and the clinical pregnancy, live birth, and singleton live birth rates for IVF/ICSI cycles. In FET cycles, success rates in 2009 were similar to those of 2008. In IVF/ICSI-DO cycles, the 2009 clinical pregnancy rate was similar to that of 2008, but live birth and singleton live birth rates showed increases.

Compared with 2008, multiple birth rate decreased in IVF/ICSI-DO cycles, but not in IVF/ICSI or FET cycles. The lower high-order multiple birth rate for IVF/ICSI cycles seen in 2007 and 2008 was maintained, but not further decreased, in 2009.

Table 13. Comparison of cycle outcomes from CARTR for the years 2006 to 2009.

Outcome	CARTR 2006 (6)	CARTR 2007 (7)	CARTR 2008 (8)	CARTR 2009
No. of clinics participating (%)	25 (100)	26 (100)	28 (100)	28 (100)
Total no. of ART cycles reported	12,052	13,482	15,000	16,315
IVF/ICSI cycles				
No. of cycles reported	8278	8972	9904	10,532
Cycles with ICSI (%)	64	68	71	72
Cycles in women aged ≥ 40 y (%)	17	17	19	19
Cycles with ≤ 2 embryos transferred (%)	67	69	69	71
Clinical pregnancy rate per cycle (%)	33.7	35.6	36.5	37.6
Live birth rate per cycle (%)	27.1	28.6	29.1	30.2
Singleton live birth rate per cycle (%)	18.9	20.0	20.7	21.5
Multiple birth rate per delivery (%)	30.3	30.2	28.9	28.7
Triplet or more rate per delivery (%)	1.5	1.1	1.0	1.0
FET cycles				
No. of cycles reported	2838	3224	3738	4223
Clinical pregnancy rate per cycle (%)	24.3	23.7	26.0	26.4
Live birth rate per cycle (%)	18.6	17.8	19.8	19.8
Singleton live birth rate per cycle (%)	14.4	13.5	15.7	15.6
Multiple birth rate per delivery (%)	22.5	24.1	20.3	20.9
Triplet or more rate per delivery (%)	0.6	0.2	0.9	0.7
IVF/ICSI-DO cycles				
No. of cycles reported	350	404	431	486
Clinical pregnancy rate per cycle (%)	42.3	44.6	49.7	49.6
Live birth rate per cycle (%)	33.6	36.1	39.8	41.5
Singleton live birth rate per cycle (%)	20.9	26.4	24.7	28.0
Multiple birth rate per delivery (%)	37.3	26.5	37.4	32.8
Triplet or more rate per delivery (%)	0	0	1.1	1.5

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Appendix – 28 Canadian ART Centres Reporting Data to CARTR for 2009

Western Canada

Victoria Fertility Centre, Victoria, British Columbia
 University of British Columbia Centre for Reproductive Health, Vancouver, British Columbia
 Genesis Fertility Centre, Vancouver, British Columbia
 Pacific Centre for Reproductive Medicine, Burnaby, British Columbia
 Regional Fertility Programme, Calgary, Alberta
 Edmonton Fertility & Women's Endocrine Clinic, Edmonton, Alberta
 Assisted Reproductive Technology at University of Saskatchewan (ARTUS), Saskatoon,
 Saskatchewan
 Heartland Fertility Clinic, Winnipeg, Manitoba

Ontario

The Fertility Clinic at London Health Sciences Centre, London, Ontario
 Ontario Network of Experts in (ONE) Fertility, Burlington, Ontario
 ISIS Regional Fertility Centre, Mississauga, Ontario
 Astra Fertility Centre, Mississauga, Ontario
 NewLife Fertility Centre, Mississauga, Ontario
 CReATe IVF Programme, Toronto, Ontario
 LifeQuest Centre for Reproductive Medicine, Toronto, Ontario
 Mt. Sinai Centre for Fertility and Reproductive Health, Toronto, Ontario
 Toronto Centre for Advanced Reproductive Technology (TCART), Toronto, Ontario
 Toronto Institute for Reproductive Medicine (ReproMed), Toronto, Ontario
 IVF Canada & LIFE Programme, Scarborough, Ontario
 Nahal Fertility Programme, Richmond Hill, Ontario
 Markham Fertility Centre, Markham, Ontario
 Ottawa Fertility Centre, Ottawa, Ontario

Quebec

McGill University Reproductive Centre, Montreal, Quebec
 Montreal Fertility Centre, Montreal, Quebec
 OVO Fertility Clinic, Montreal, Quebec
 Procrea, Montreal and Quebec, Quebec

Atlantic Canada

Conceptia Clinic, Moncton, New Brunswick
 Atlantic Assisted Reproductive Therapies (AART), Halifax, Nova Scotia