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Validation of Infertility Treatment and Assisted Reproductive Technology Use On the Birth Certificate in Eight States

Barbara Luke, ScD, MPH,

Department of Obstetrics, Gynecology, and Reproductive Biology, College of Human Medicine, Michigan State University, East Lansing, Michigan 48824

Morton B. Brown, PhD, and

Department of Biostatistics, School of Public Health, University of Michigan, Ann Arbor, Michigan 48109

Logan G. Spector, PhD

Department of Pediatrics, University of Minnesota, Minneapolis, Minnesota 55455

Objective

In 2013, 1.7% of births in the US were the result of in vitro fertilization (IVF) (1, 2). Identifying children born from infertility treatments using vital records would help clarify the etiology of adverse perinatal outcomes on a population basis (3). Data from the National Survey of Family Growth indicate that infertility services used include ovulation drugs (5.8%), artificial insemination (1.7%), and IVF (0.7%) (4). The 2003 revision of the US Certificate of Live Birth includes three questions regarding the use of infertility treatments: Q1) Pregnancy resulted from infertility treatment; Q2) Fertility-enhancing drugs, artificial insemination (AI) or intrauterine insemination (IUI); Q3) Assisted reproductive technology (e.g., IVF, gamete intrafallopian transfer (GIFT)). As part of a larger study evaluating IVF and the risk of childhood cancer (NIH grant, R01 CA151973), we evaluated the accuracy of infertility treatment and IVF reported on the birth certificate.

Study Design

IVF cycles from the Society for Assisted Reproductive Technology Clinic Online Reporting System (SART CORS), which includes more than 95% of all IVF cycles performed in the US, were linked to certificates of live birth in Florida, Massachusetts, New York, and Pennsylvania (2004-09 births), Texas (2005-09 births), California and Ohio (2006-09 births), and Colorado (2007-09 births) (IVF children). Redshift Technologies, Inc. (who maintains the SART CORS for SART) sent a file to each of the eight study States that included: woman's name, social security number, date of birth, zip code, date of delivery, plurality, gender(s), and birthweight(s); using these identifiers, the linkage rate was >95%. All other live births to the same woman were also identified (IVF siblings). As part of the primary study, a 10:1 sample of control deliveries (deliveries where the mother was not in the SART

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CORS database) were selected by the same States and in the same years as the IVF children. Controls were selected as all infants in the next ten deliveries; if this was not possible, they were chosen as a random sample of ten deliveries from the same month and year as the IVF births. Once linked, the data was de-identified before being sent to the investigators. Since not all items were included by each State, we created a summary item: Any infertility question checked 'Yes'. Information on the birth certificate was evaluated for each of the three groups of children, overall and by plurality (singleton vs multiple birth). IRB approval was obtained from each State and each University of the investigators.

Results

The study population included 716,103 live births (69,969 IVF children, 9,489 IVF siblings, and 636,645 control children). Sensitivity and specificity were calculated to measure the accuracy of IVF use reported on the birth certificate compared to IVF use recorded in the SART CORS. The sensitivity of Q3 was 28.2% and the specificity was 99.7%. Only 36.5% of births of IVF children were identified by any checkbox on the birth certificate; multiple pregnancies were more likely to be indicated as the result of infertility treatment than singletons (43.4% vs 33.3%). If this undercount is applied to the IVF siblings, about one-third of the singletons and nearly all of the multiple births also resulted from some type of infertility treatment.

Conclusions

These results, based on multi-year data from eight States, suggest that infertility treatment and IVF are greatly under-reported on the birth certificate, accurately identifying only about one-third (36.5%) of children conceived with IVF, confirming the percentage reported by prior studies (5, 6). If this under-reporting estimate is applied to the controls, about 1.5% of singletons and about 25% of multiples were conceived with some type of infertility treatment.

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Table

The distribution (%) by study group, plurality, and checkbox item on the birth certificate *

		IVF Children	IVF Siblings	Control Children
	Overall	69,969	9,489	636,645
	Singleton births	47,737	8,890	623,030
	Multiple births	22,232	599	13,615
Q1: Pregnancy resulted from infertility treatment	Overall	36.8	14.1	0.8
	Singleton births	33.8	12.3	0.6
	Multiple births	43.0	38.4	8.9
Q2: Fertility-enhancing drugs, AI, or IUI	Overall	11.5	6.2	0.4
	Singleton births	10.1	5.2	0.3
	Multiple births	14.4	20.6	5.3
Q3: Assisted reproductive technology, IVF, or GIFT	Overall	28.2	5.5	0.3
	Singleton births	26.0	4.9	0.2
	Multiple births	33.0	15.0	4.0
Summary: any infertility item checked 'Yes' **	Overall	36.5	12.8	0.7
	Singleton births	33.3	11.1	0.5
	Multiple births	43.4	37.1	8.7

* Percents were computed from the years that the item was present; States may not have included all items on the birth certificate.

** The response is included in the summary when at least one of the three items was present on the birth certificate.