



HHS Public Access

Author manuscript

N Engl J Med. Author manuscript; available in PMC 2015 October 15.

Published in final edited form as:

N Engl J Med. 2014 July 3; 371(1): 91–93. doi:10.1056/NEJMc1404371.

Monitoring Health Outcomes of Assisted Reproductive Technology

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TO THE EDITOR

During the past 35 years, assisted reproductive technology has been transformed from a miracle to a standard and common part of medical practice. Although this technology is believed to be safe and has resulted in more than 5 million infants born globally, rapid technological progress leading to treatment modifications makes it important to continually monitor the safety of assisted reproductive technology for the rapidly growing population of users of the technology and infants conceived with its use.

Although many countries have national registries to monitor the use and effectiveness of assisted reproductive technology, they are typically not designed to collect data beyond delivery. In the United States, the Centers for Disease Control and Prevention (CDC) maintains the National ART (Assisted Reproductive Technology) Surveillance System (NASS), which collects limited information about treatment outcome (live birth data are limited to plurality, infant sex, birth weight, and gestational age). Studying the long-term health outcomes of assisted reproductive technology is difficult owing to the relative infrequency of both the exposure to it and the outcomes of interest (e.g., birth defects, cancer, and developmental disorders) and to the sensitive nature of the fertility treatments. Our knowledge of the long-term effect of assisted reproductive technology on maternal and child health is thus quite limited.¹

To better understand the effect of assisted reproductive technology on maternal and child health and to improve state-based surveillance, in 2001 the CDC's Division of Reproductive Health initiated linkage of the NASS data with Massachusetts birth-certificate data. This small pilot project has since grown into the States Monitoring ART (SMART) Collaborative, which includes Massachusetts, Michigan, Florida, and Connecticut, with creative integration of existing surveillance systems and registries (e.g., hospital-discharge, birth-defects, and cancer registries) and broad collaboration among the federal government, state health departments, universities, and professional societies.² The SMART Collaborative serves as a platform for researchers to study the short- and long-term

The findings and conclusions in this letter are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Disclosure forms provided by the authors are available with the full text of this letter at NEJM.org.

outcomes of assisted reproductive technology, drawing from the large sample of infants conceived with the use of this technology. The collaborative is also used for state-based monitoring of one of the most serious and costly adverse consequences of assisted reproductive technology — preterm births, which are estimated to result in a societal economic burden of more than \$1.3 billion annually (Table 1).^{3,4}

The field of assisted reproductive technology would benefit from closer monitoring of its safety. The renewed emphasis on patient safety in the United States⁵ calls for developing new tools or adapting old ones to identify the problem, to address the problem, and to measure progress. The integration of existing surveillance systems and registries could create an efficient infrastructure for conducting both important population-based, patient-centered research on the outcomes of assisted reproductive technology and state-based public health surveillance aimed at protecting maternal and child health.

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Table 1

Infants, Preterm Infants, and the Societal Economic Burden of Preterm Births Conceived through Assisted Reproductive Technology in the United States (2010).*

State, District, or Territory	Infants Conceived through Assisted Reproductive Technology		
	Total No. of Infants	No. of Preterm Infants	Societal Economic Burden Associated with Preterm Infants 2013 \$
California	7,540	2,573	158,800,414
New York	6,258	2,008	123,929,744
Texas	4,347	1,998	123,312,564
New Jersey	3,803	1,420	87,639,560
Illinois	3,775	1,325	81,776,350
Massachusetts	3,480	1,035	63,878,130
Florida	2,402	994	61,347,692
Pennsylvania	2,162	754	46,535,372
Virginia	1,931	683	42,153,394
Maryland	1,856	602	37,154,236
Ohio	1,512	542	33,451,156
Michigan	1,460	527	32,525,386
North Carolina	1,455	557	34,376,926
Connecticut	1,404	463	28,575,434
Georgia	1,390	552	34,068,336
Washington	1,318	442	27,279,356
Minnesota	1,050	353	21,786,454
Colorado	994	417	25,736,406
Arizona	921	374	23,082,532
Indiana	705	308	19,009,144
Missouri	672	289	17,836,502
Wisconsin	568	215	13,269,370
Oregon	560	212	13,084,216
Iowa	541	199	12,281,882
Utah	522	237	14,627,166
South Carolina	521	226	13,948,268
Nevada	479	236	14,565,448
Tennessee	458	167	10,306,906
Kentucky	453	187	11,541,266
Louisiana	415	176	10,862,368
Oklahoma	369	170	10,492,060
Alabama	368	148	9,134,264
District of Columbia	337	103	6,356,954

State, District, or Territory	Infants Conceived through Assisted Reproductive Technology		
	Total No. of Infants	No. of Preterm Infants	Societal Economic Burden Associated with Preterm Infants 2013 \$
Kansas	315	116	7,159,288
New Hampshire	288	68	4,196,824
Idaho	244	112	6,912,416
Rhode Island	239	80	4,937,440
Hawaii	236	111	6,850,698
New Mexico	229	89	5,492,902
Nebraska	210	94	5,801,492
Delaware	204	56	3,456,208
Arkansas	203	69	4,258,542
Mississippi	163	66	4,073,388
West Virginia	124	42	2,592,156
Montana	105	42	2,592,156
Other states and territories	533	201	12,405,318
Total	59,119	21,638	1,335,454,084

* The state, district, or territory indicates the place of patient residency; in cases of missing residency data (4%), we used the place in which the assisted-reproductive-technology procedure was performed; states or territories with fewer than 100 infants conceived through assisted reproductive technology were included in the category for other states and territories. Data on all infants and preterm infants conceived through assisted reproductive technology are from Sunderam et al.³ Calculations of societal economic burden were based on an assumption of an average burden of \$51,600 (\$61,718 in 2013 U.S. dollars) per infant born preterm, in accordance with calculations from the Institute of Medicine.⁴