



Short communication

CDC-reported assisted reproductive technology live-birth rates may mislead the public

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ABSTRACT

The Centre for Disease Control and Prevention (CDC) publicly reports assisted reproductive technology live-birth rates (LBR) for each US fertility clinic under legal mandate. The 2014 CDC report excluded 35,406 of 184,527 (19.2%) autologous assisted reproductive technology cycles that involved embryo or oocyte banking from LBR calculations. This study calculated 2014 total clinic LBR for all patients utilizing autologous oocytes two ways: including all initiated assisted reproductive technology cycles or excluding banking cycles, as done by the CDC. The main limitation of this analysis is the CDC report did not differentiate between cycles involving long-term banking of embryos or oocytes for fertility preservation from cycles involving short-term embryo banking. Twenty-seven of 458 (6%) clinics reported over 40% of autologous cycles involved banking, collectively performing 12% of all US assisted reproductive technology cycles. LBR in these outlier clinics calculated by the CDC method, was higher than the other 94% of clinics (33.1% versus 31.1%). However, recalculated LBR including banking cycles in the outlier clinics was lower than the other 94% of clinics (15.5% versus 26.6%). LBR calculated by the two methods increasingly diverged based on proportion of banking cycles performed by each clinic reaching 4.5-fold, thereby, potentially misleading the public.

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Introduction

Based on the Fertility Clinic Success Rate and Certification Act of 1992 (FCSRCA), fertility clinics in the USA have to report annually assisted reproductive technology outcome data to the Centre for Disease Control and Prevention (CDC). This law defines success of assisted reproductive technology by live-births rates (LBR) per attempted ovarian stimulation, and tasks the CDC to annually report LBR for each clinic. The principal architect of FCSRCA, US Senator Ron Wyden has described this law as a public reporting model for other medical and surgical specialties (Adashi and Wyden, 2011).

Rapidly increasing utilization of embryo-banking cycles, in which all embryos are cryopreserved and no fresh transfer occurs, have confounded the purpose of this reporting system since, in contradiction to the intent of the FCSRCA, such cycles are currently excluded by the CDC from calculations of LBR (Kissin et al., 2013; Kushnir et al., 2013). Excluding such cycles significantly inflates reported LBR by shrinking the denominator of initiated assisted reproductive technology cycles, which are a major burden and cost for patients. This is particularly true for poor prognosis patients who are preferentially directed to embryo banking (Kushnir et al., 2013). Assisted reproductive technology clinics which perform many embryo banking cycles, therefore, benefit from reporting inflated LBR (Kushnir et al., 2016).

The objective of this analysis was to determine the degree by which assisted reproductive technology LBR are inflated in the CDC annual report based on proportion of embryo banking performed by each fertility clinic.

Materials and methods

We re-analysed publicly accessible, aggregate fertility clinic data used to generate the CDC's (2014 Assisted Reproductive Technology Fertility Clinic Success Rates Report). Total clinic LBR for all patients utilizing autologous oocytes in both fresh and frozen embryo cycles were calculated, as previously described, with reference to cycle initiation (Kushnir et al., 2016) in two ways: either, as intended by FCSRCA, including all initiated assisted reproductive technology cycles or, as currently practiced by the CDC, excluding banking cycles. The CDC currently records both oocyte and embryo banking as a single data point. Calculations were performed as follows: total number of autologous oocyte/embryo assisted reproductive technology cycles reported as banking cycles by the centre for all ages (delayed transfer and fertility preservation not distinguished) = A. Total fresh and frozen initiated autologous oocyte/embryo assisted reproductive technology cycles reported by the centre for all ages = B. Number of live births for fresh autologous cycles = percentage LBR per cycle for each age group × total number of cycles reported for that age group = C. Number of live births for thawed autologous cycles = percentage LBR per transfer for each age group × total number of transfers reported for that age group = D.

$$\text{LBR FCSRCA} = ((C + D) / (A + B)) \times 100$$

$$\text{LBR CDC} = ((C + D) / B) \times 100$$

$$\text{Percentage banking} = (A / (A + B)) \times 100$$

LBR were then analysed by linear regression models. All analyses were performed using SAS version 9.4 (SAS Institute Inc., USA).

Results

In 2014, 458 assisted reproductive technology clinics performed 184,527 autologous oocyte assisted reproductive technology cycles. Among those, 35,406 (19.2%) were categorized as banking cycles and, therefore, were excluded from CDC assisted reproductive technology LBR calculations. A total of 46,557 live births were reported, for a national LBR of 31.2% per CDC; but only of 25.2% per FCSRCA accounting for banking cycles.

Figure 1 demonstrates that with increasing use of banking in individual assisted reproductive technology clinics, the LBR calculated by the CDC method increase, while accounting for banking per FCSRCA method, LBR substantially decrease.

Out of 458 reporting assisted reproductive technology clinics, 27 (6%) clinics reported that over 40% of their autologous cycles involved banking (Supplementary Table S1). These clinics performed 12% of all autologous US assisted reproductive technology cycles; they also demonstrated the widest gaps in LBR between CDC and FCSRCA assessments, diverging by as much as 4.5-fold.

Discussion

The presented findings demonstrate that, by statistically favouring assisted reproductive technology clinics that perform a high proportion of banking cycles, LBR for assisted reproductive technology cycles reported by the CDC are misleading. By excluding large numbers of banking cycles from consideration, these clinics present exaggerated LBR to the public but actually achieve lower LBR per initiated cycle than the national average. These observations are consistent with disproportionate use of embryo banking in poor prognosis patients (Kushnir et al., 2013, 2016) primarily for short-term accumulation of embryos (Doody, 2014), rather than genuine fertility preservation. Our findings are corroborated by a recent report examining the same issue on the parallel, voluntary assisted reproductive technology reporting system maintained by the Society for Reproductive Technology (SART) (Kulak et al., 2016). SART has recognized the issues posed by short-term accumulation of embryos and has recently made extensive changes to its reporting system to more accurately present the data in its reports (Doody, 2014, 2016). Because of the recent changes in calculating assisted reproductive technology LBR by SART, the public may now face varying outcome reports from two authoritative sources (CDC and SART). While the two organizations have different missions, presentation of divergent LBR to the public will create more confusion, thereby eroding trust in assisted reproductive technology treatment.

Since prospective patients may use the CDC report to select assisted reproductive technology providers, exaggerated outcome reporting may be economically beneficial for a minority of assisted reproductive technology clinics. For a large majority of assisted reproductive technology clinics (94%) differences between LBR calculated per CDC or FCSRCA method are relatively small; however, in the 6% of clinics which perform extensive embryo banking reported LBR are greatly exaggerated. Current CDC reporting, therefore, incentivizes

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