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Article

A 50% reduction in multiple live birth rate is associated with a 13% cost saving: a real-life retrospective cost analysis

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KEY MESSAGE
This study reported that a 50% reduction in MLBR led to a significant cost reduction related to hospital care of 13%, as a consequence of Belgian legislation combining reimbursement of six assisted reproductive technology cycles with a legally enforced reduction in the number of embryos transferred.

A B S T R A C T

Belgian legislation limiting the number of embryos for transfer has been shown to result in a 50% reduction of the multiple live birth rate (MLBR) per cycle without having a negative impact on the cumulative delivery rate per patient within six cycles or 36 months. The objective of the current study was to evaluate the cost saving associated with a 50% reduction in MLBR. A retrospective cost analysis was performed of 213 couples, who became pregnant and had a live birth after one or more assisted reproductive technology treatment cycles, and their 254 children. The mean cost of a singleton (n = 172) and multiple (n = 41) birth was calculated based on individual hospital invoices. The cost analysis showed a significantly higher total cost (assisted reproductive technology treatment, pregnancy follow-up, delivery, child cost until the age of 2 years) for multiple births (both children: mean €43,397) than for singleton births (mean: €17,866) (Wilcoxon–Mann–Whitney $P < 0.0001$). A 50% reduction in MLBR resulted in a significant cost reduction related to hospital care of 13%.

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Introduction

Multiple pregnancies are associated with significant fetomaternal complications and high healthcare costs (Ombelet et al., 2005; Pinborg et al., 2003, 2004; Sundström and Saldeen, 2009; van Heesch et al., 2014a, 2014b). Nowadays, the most important aim of assisted reproductive technology is to achieve the live birth of a single healthy child. In many European countries, the high financial costs associated with assisted reproductive technology treatment are now partially covered by the government (Maheshwari et al., 2011). Since July 2003, the laboratory costs for six fresh assisted reproductive technology cycles have been reimbursed by the Federal Government of Belgium for women younger than 43 years of age and with a Belgian insurance number, but only if a limited number of embryos is transferred, depending on female age and cycle rank, as described previously (De Neubourg et al., 2013; Debrock et al., 2005; Peeraer et al., 2014). Belgian patients covered by health insurance also receive reimbursement for gonadotrophins, (ant)agonists and most of the costs (ultrasound, hormonal serum analysis, consultation, oocyte retrieval, embryo transfer) related to the assisted reproductive technology treatment. Thus, the majority of the costs of an assisted reproductive technology cycle is covered by the Federal Government. The limitation in the number of embryos to be transferred depending on female age and cycle ranking, known as the 'single embryo transfer (SET) strategy' was introduced in Belgium to reduce the multiple live birth rate (MLBR) with the goal of decreasing the maternal and neonatal costs associated with multiple pregnancy. The budget saved by this policy was then anticipated to cover reimbursement for the laboratory cost of six fresh assisted reproductive technology cycles and consecutive cryopreserved embryo transfer cycles. Based on this assumption, a reduction in MLBR would lead to a reduction in MLBR-related costs, thereby saving healthcare money that could serve for a better reimbursement of assisted reproductive technology-related costs and improving access to infertility care. It has been demonstrated that this policy has resulted in a significant reduction in the MLBR after assisted reproductive technology treatment, from 24% to 12% (De Neubourg et al., 2013) without a negative effect on the cumulative delivery rate (CDR) within six assisted reproductive technology cycles of 36 months of treatment (De Neubourg et al., 2010, 2016; Peeraer et al., 2014). However, the real cost saving associated with a 50% reduction in MLBR has never been estimated by calculations based on real healthcare expenditures. Therefore, we investigated the economic effect of a reduction of the multiple delivery rate by 50%, by linking data from the clinical assisted reproductive technology database used in our previous study (Peeraer et al., 2014) to patient hospital cost data for assisted reproductive technology treatment, pregnancy, delivery and paediatric costs up to the age of 2 years.

Materials and methods

Patient selection

This retrospective cost analysis was performed at the Leuven University Fertility Centre, after approval by the Ethical Committee (ML 7701 Amend-Id: 0002, 22 December 2015) as an additional cost analysis on a previous retrospective cohort study (ML 7701). For the selection of patients, we refer to this study (July 1999 to June 2002 and July 2003 to June 2006) (Peeraer et al., 2014). For the current study, the assisted reproductive technology database used in our previous cohort study (Peeraer et al., 2014) was searched to identify and select all patients who had received not only their complete assisted reproductive technology treatment (including all monitoring visits, oocyte aspirations and embryo transfers), but who also had their complete pregnancy follow-up and delivery in Leuven University Hospital. A total of 213 patients met these criteria, while the other 1045 patients were excluded because monitoring visits, pregnancy follow-up and delivery were performed partially or fully in secondary care centres and no hospital bills were available. Therefore, this retrospective cohort study included 213 couples delivering 172 singleton infants and 82 twin infants in Leuven University Hospital after assisted reproductive technology treatment.

Data collection

All individual hospital bills from mother and child were retrieved from the Leuven University Hospital information system by the management information and reporting department of the hospital. We included individual hospital records related to an outpatient contact or hospitalisation in departments related to infertility care (gynaecology, maternity, fertility, neonatology, paediatrics and anaesthesiology) in order to exclude other possible healthcare costs not related to assisted reproductive technology treatment and outcome of children. All individual hospital invoices were collected from the beginning of the assisted reproductive technology treatment (including failed assisted reproductive technology cycles) until pregnancy and delivery. Costs related to assisted reproductive technology treatment included: outpatient doctor visits, monitoring visits before, during or after hormonal stimulation (hormonal blood samples and ultrasound), medical procedures (oocyte aspiration, embryo transfer) and hospital admissions. Costs related to medical follow-up of pregnancy and delivery included: outpatient consultations, sonography, chorion villus sampling, amniocentesis, medical procedures, surgery, delivery and hospital admissions. Costs related to the children born after assisted reproductive technology treatment were collected until the age of 2 years and included: outpatient consultations, medical procedures, surgery and hospital admission. Self-medication obtained outside the hospital was not included in our cost calculation.

Costs were expressed in euro (€). We also replaced the hospital-specific fee per day charged in cases of hospitalisation by a national mean corrected for pathology. In this way, we tried to avoid the bias in cost due to the specific nature of a university setting. The average national fee per day which is assigned to every admitted patient per APR-DRG (All Patients Refined Diagnosis Related Group) and SOI (severity of illness) was obtained from the website of the Federal Government of Belgium (https://tct.fgov.be/). This national database provides the average cost per hospital admission for all APR-DRGs paid by public health insurance and the patient (co-payment). This approach makes our data more representative for all Belgian assisted reproductive technology centres. In order to calculate the cost of assisted reproductive technology treatment, we used the fixed fee of the laboratory activities (€1497) and medication (€920) as covered in 2015 by Belgian health insurance. All costs were adjusted to the price level of 2015 using the consumer price index in order to facilitate comparison over time.

Cost analysis

The analysis was performed from the healthcare payer's perspective (Federal Government, Belgian communities and patients).

We calculated the cost of a singleton and multiple live birth, based on hospital invoices, from the beginning of the assisted reproductive

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