Reproductive BioMedicine Online (2014) **29**, 281–285

www.sciencedirect.com
www.rbmonline.com

ARTICLE

# On the cost and prevention of iatrogenic multiple pregnancies

**Brian D Allen** [a], **Eli Y Adashi** [b], **Howard W Jones Jr** [c,*]

[a] *Allen Consulting, Inc., 2003 Springdale Court, Coralville, IA 52241, USA*; [b] *The Warren Alpert Medical School, Brown University, Providence, RI 02912, USA*; [c] *Jones Institute for Reproductive Medicine, Eastern Virginia Medical School, 601 Colley Avenue, Norfolk, VA 23507, USA*

* Corresponding author. *E-mail address:* joneshw@evms.edu (HW Jones Jr).

Brian D Allen, BGS has over 28 years of experience in the health insurance industry working as a liaison between patients, medical providers and healthcare payers regarding infertility benefits. His accomplishments include authoring two patient education booklets, coauthoring many cost-related infertility medical articles and negotiating contemporary infertility benefits, including pay-for-performance incentives, with healthcare payers. Brian is the founder and president of Allen Consulting, a medical billing and coding consulting company that consults with reproductive medicine and obstetrics/gynaecology practices throughout the country.

**Abstract** Multiple pregnancies are an undesirable complication of IVF and of ovulation induction and/or ovulation enhancement without IVF. Studies based on published population data and data from the Centers for Disease Control and Prevention indicate that savings from the mitigation of iatrogenic multiples would save money in the billions ($10^9$) of US dollars on a national basis. The aim of this study was to determine whether, using real data from a major regional insurance carrier for the interval 2005–2009 covering obstetric costs requiring hospitalization and neonatal costs through the first year, it was possible to show that the cost saved by eliminating iatrogenic multiple births would be adequate to fund a protocol to minimize iatrogenic multiple births. The net savings on an annual basis for the study group of 13,478 was about US$4.4 million. Applying the regional findings to national data suggests savings of approximately US$6.3 billion if national iatrogenic multiples were eliminated. These findings indicate that the health insurance industry should be able to offer infertility coverage at a lower rate by requiring a treatment algorithm designed to essentially eliminate iatrogenic multiple pregnancies. It is concluded that efforts should be made to assure a singleton birth when treating infertility.



**KEYWORDS:** iatrogenic multiple births, intrauterine insemination, IVF, multiple births, single-embryo transfer

## Introduction

A previous communication reliant on publicly available data by this research group postulated that the elimination of outmoded forms of infertility therapy, restricted use of intrauterine insemination (IUI) and requirement for single-embryo transfer would essentially eliminate iatrogenic multiple births and greatly reduce the costs thereof (Jones and Allen, 2009). It was further noted that the attendant cost savings would be more than sufficient to underwrite the insurance premiums for the provision of cutting-edge

http://dx.doi.org/10.1016/j.rbmo.2014.04.012
1472-6483/

infertility therapy to all women between the ages of 15–44 years in the USA. The analysis reported herein seeks to put the aforementioned thesis to the test by reviewing the claims data of a single leading health plan for the 2005–2009 interval. Special efforts were made to establish the costs associated with iatrogenic multiple births and the complications thereof.

## Materials and methods

To protect the identity of any and all of the patients under study, the health plan in question required that it remain anonymous. Two Institutional Review Board exemptions for this study were secured from Sterling Institutional Review Board, Atlanta, Georgia (reference nos. 4117 and 4189, approved 7 August 2012 and 8 November 2012).

The health plan under study made use of a comprehensive database replete with the following codes: Current Procedural Terminology, International Classification of Diseases revision 9, Diagnosis-Related Group and facility revenue codes. Thus, this work was informed of all payments prior to and including delivery costs and the costs associated with the first year of the baby's/babies' life/lives. For the mother, this included all inpatient costs immediately prior to and including delivery (there were no antepartum costs for the mother). These costs included inpatient care, physician charges and delivery and anaesthetic charges. Her hospital costs included her daily inpatient charge, blood and laboratory cost, ultrasound cost and medications. All charges when the mother was an inpatient were included. For the infant(s), all delivery costs included neonatal, intensive care, laboratory, ultrasounds, medications and physician services including paediatrician and any other specialists. After neonatal discharge, any services including readmission were covered to age 1.

Using the billing codes, the health plan was able to accurately identify all of the enrolled patients who gave birth, including multiple births, during the 2005–2009 interval. Use was made of the comprehensive list of Current Procedural Terminology procedure codes and Healthcare Common Procedure Coding and System procedure codes with an eye towards identifying the provision of infertility treatment services. In each and every case of multiple birth, the health plan further searched for the month and year of the billing codes indicative of the provision of infertility services for up to 12 months prior to delivery. Most notably, this analysis was limited to the provision of IUI and IVF services in light of their known association with the genesis of multiple births. Insurance payment data do not specify whether ovarian stimulation was used before IUI. The patients requiring treatment for infertility were used to identify which multiple births were deemed iatrogenic.

The case inclusion criteria consisted of the following: (i) the mother must have been enrolled for at least 12 member months with the health plan prior to delivery in order to determine the frequency of infertility therapy; (ii) the baby/babies must have been enrolled for at least 12 member months with the health plan post delivery in order to determine the cost of neonatal therapy; and (iii) the patient must have given birth to at least one live infant. Over half (54%) of the enrollees encompassed by this study were excluded for failure to meet the inclusion criteria.

Multiple births noted within the birth cohort were deemed iatrogenic if and when associated with a treatment code for IUI or IVF within a month prior to the pregnancy. It is possible that some singletons had IUI or IVF but these were not identifiable. Their identification would have had no influence on the conclusion of the study. To compare the regional group with national figures, national multiple ratios were applied to the regional group. For national data, iatrogenic multiples were identified by subtracting from all multiples those multiples that were considered to be spontaneous, using the national singleton, twin and higher-order birth rates for 1980.

## Results

In the course of the 5-year study, the health plan reported a total of 29,168 deliveries. Of those, 15,690 deliveries were excluded for failure to meet the required inclusion criteria. In 7715 deliveries, the mother was not enrolled with the health plan for at least 12 member months prior to delivery. In 7901 deliveries, the infants born were not enrolled with the health plan for at least 12 member months post delivery. In 74 deliveries, no live infant was born.

Among the 13,478 deliveries that met the inclusion criteria (**Table 1**), 406 constituted multiple births. In effect, these 406 deliveries represented 405 patients in that one of the patients in question gave birth twice to twins during the study period.

Broken down by multiplicity and the cost per delivery (as incurred by the health plan) the 13,478 deliveries which met the required inclusion criteria segregated as follows: singletons 13,072 (US$18,244 per delivery); twins 387 (US$97,987 per delivery); triplets and higher-order multiples 19 (US$391,700 per delivery) (**Table 2**). Multiple births constituted 3% of the 13,478 births that met the required inclusion criteria but accounted for 15.9% of the total cost paid by the health plan to both physician and hospital providers for medical services rendered.

The insurance company search for the specified infertility treatment billing codes among multiple pregnancies for 12 months prior to mothers' deliveries revealed the following: 183 with no treatment codes had 179 twins and four triplets or more (presumably spontaneous); 52 with the treatment code IUI had 46 twins and six triplets or more (presumable iatrogenic); and 171 with the treatment code IVF had 162 twins and nine triplets or more (presumably iatrogenic).

The cost of the iatrogenic twins was US$20,381,296 and for the iatrogenic triplets or more was US$5,875,500. The total was US$26,256,796. If these multiples had been singletons at a total cost of US$4,068,412, the annual savings would have been US$4,437,677 (**Table 2**).

Using the twin insurance cost as estimated by this study (US$97,987) and applying this cost to the national number of iatrogenic twins between 2005–2009 (273,624) yielded a twin cost of US$26,811,594,888 (**Table 3**). Applying the same method for triplets, which according to the study cost US$391,700, to the 26,446 iatrogenic triplets gave a triplet cost of US$10,358,898,200. According to this study, the cost of a singleton delivery was US$18,244. Thus, if all multiples