

# Economic Implications of Insurance Coverage for in Vitro Fertilization in the United States

## A Review

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**OBJECTIVE:** To analyze cost-effectiveness studies in regard to the costs of in vitro fertilization (IVF) and discuss specific economic trends that may affect the future utilization of IVF in the United States.

**STUDY DESIGN:** Health economics. A Pub Med literature review and the Centers for Disease Control's (CDC) Fertility Clinic Success Rate registry served to access cost analyses and trends, respectively.

**RESULTS:** The average cost of an IVF cycle in the U.S. is \$9,226. Among policies that provide IVF services, the increase in premium per month ranges from \$0.67 to \$14.

**CONCLUSION:** When IVF is provided as a health benefit, the cost increases can be variable. As utilization increases, contemporary cost analyses and outcomes research will aid providers, third-party payers and policymakers in better understanding the economic impact of IVF. (J Reprod Med 2009;54:661–668)

**Keywords:** fertilization, in vitro; health policy; infertility; insurance health; mandated benefits.

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**As both economic and social forces continue to change, estimating the true cost of IVF will evolve as utilization of IVF services increases.**

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Since the first successful in vitro fertilization (IVF) cycle nearly 3 decades ago, it has been estimated that 1–2% of live births in the United States have been conceived through the assistance of IVF.<sup>1–3</sup> As the indications for IVF evolve, the utilization of IVF in the United States has increased, with a peak of 94,419 fresh cycles initiated in 2006.<sup>2</sup> The average cost of an IVF cycle has been estimated to account

for 0.03% of U.S. health care costs.<sup>4</sup> However, with increased utilization, questions have been raised regarding third party coverage and its effect on the overall costs of IVF.

Efforts to quantify the costs of IVF were performed during the 1990s and focused on cost-effectiveness analysis. This analysis was challenging for many reasons. Specifically, most medical therapies are assessed on their ability to extend life or improve quality of life. Alternatively, IVF provides an improved opportunity to achieve live birth and does not directly apply to one's ability to extend life.<sup>5</sup> As a result, follow-up studies opted to

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view the cost-effectiveness of IVF by estimating the total costs of IVF services and then calculate the effect on insurance premiums.<sup>6</sup> Overall, these studies suggest that insurance policies that provide IVF services in the United States affected the per member per month premium cost by an increase of \$0.67 to \$2.59 (Table I).

Reliably comparing and drawing conclusions on

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***Future studies that compare (1) real cost data, (2) the impact of access cost, and (3) pregnancy and multiple-gestation rates in states with mandated benefits and those without will help guide future policy regarding IVF delivery in the United States.***

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the contribution of U.S. health care dollars toward IVF services vs. other infertility costs and/ or other common elective women's health procedures is challenging as these particular subcategories are not represented in the Centers for Medicare and Medicaid Services (CMS) analysis of U.S. total health care expenditures. However, analysis of 1 university's health plan over 3 years found that 0.79% of the university's total health care costs are related to "infertility specific costs." This may provide a guide in estimating the nation's trend.<sup>4</sup>

Ultimately, our aim was to review the cost effectiveness studies in regard to the costs of IVF and to provide further insight into the utilization and costs of IVF services in the United States.

#### **Materials and Methods**

Utilizing Pub Med (<http://www.ncbi.nlm.nih.gov/pubmed>), we conducted a literature search restricted to the English language using the key words *in vitro fertilization, IVF, cost-effectiveness* and *coverage*. A manual search of references was then performed to collect additional articles. Information regarding trends in overall health care expenditures and IVF utilization was derived from the CMS website ([www.cms.gov](http://www.cms.gov)) and the Centers for Disease Control and Prevention (CDC) website and Fertility Clinic Success Rate registry, respectively. Since this review did not involve human experimentation, ap-

roval by an institutional review board was not required.

#### **Results**

##### *What is the Cost of IVF per Pregnancy?*

Initially, attention was focused on the calculated and actual costs of IVF. This was then followed by studies that measured the cost of IVF in regard to the risks of multiple gestations. The average estimated cost of an IVF cycle is between \$8,000 and \$10,500 according to data collected from several regional IVF clinics in the United States.<sup>7</sup> In 2001, the cost of an IVF cycle in the United States was estimated to be \$9,226.<sup>8</sup> Throughout these studies, the cost of multiple gestations and preterm delivery was noted to lead to higher costs. In 1994, the estimated cost of an IVF cycle using cost-of-service figures was extracted from 6 IVF clinics in various regions of the United States to calculate a baseline cost. Maternal complications, time away from work, neonatal complications and other outcome measures were then calculated and added. The cost of IVF per delivery ranged from \$66,667 with the first cycle to \$114,286 for the sixth cycle. Using various measurements, the estimated cost of IVF could be as low as \$44,000 per delivery to as high as \$211,940.<sup>7</sup>

Similarly, another group reviewed the actual charges for all women, pregnant as a result of IVF, who delivered in their hospital over a 2-year span. The group's cost per woman who delivered was \$65,872.<sup>9</sup> This study included the cost of antenatal and neonatal hospitalization. Lost wages and the ongoing cost of premature neonates once they were discharged from the nursery were estimated separately and resulted in an additional \$18,447 per woman who delivered.<sup>9</sup> The latter figure was calculated using an estimate of \$100,000 per infant admitted to the neonatal intensive care unit (NICU), which was based on a study of the cost of caring for infants born before 30 weeks' gestation.<sup>10</sup> The cost of NICU stays per delivery of singleton and twin pregnancies to IVF mothers was estimated at \$2,339 per delivery, whereas in triplet and quadruplet pregnancies, the cost of NICU stays per delivery was \$175,039.

When viewing the economic impact of IVF, it is imperative to delineate between actual charges for the services (e.g., the cost of semen collection, operative time for oocyte retrieval, etc.) vs. the "indirect costs," which tend to include cost to society in terms of preterm infants, time lost from work and need for

repeat trials. From a policy standpoint, focusing on overall costs may be more appropriate.

#### *What Is the Cost to Provide Insurance Coverage for IVF?*

During the early 1990s, investigators began exploring the costs of insurance coverage of this service. Common reasons cited against insurance coverage of IVF included: (1) it is not medically necessary to preserve the patient's health, (2) it is experimental, and (c) infertility constitutes a preexisting condition.<sup>11</sup> As a result, treatment plans may be influenced by economic reasons instead of strict medical indications.<sup>6</sup> In 1993, data were collected from a survey regarding charges for IVF-related services in the United States. Seventy-one clinics, which provided data to the American Society of Reproductive Medicine (ASRM) IVF Registry, reported charges for completed cycles, which were adjusted to take into account incomplete cycles. (A cycle includes: initiation of ovulation induction, retrieval and transfer).<sup>5</sup>

Overall, the total cost of IVF services in 1993, calculated by multiplying the total number of cycles performed during the year (31,718) by the adjusted cost per initiated cycle (\$6,233), was \$197,698,000. Using several assumptions, additional adjustments and including women of childbearing age in a family with a full-time employee (15–44 years) the average cost of IVF services per employee was \$2.59 and \$2.27 when including a cost sharing plan.<sup>5</sup> From a statewide perspective, in 1993, infertility-related expenditures accounted for 0.41% of total expenditures, with a large indemnity-type payer in the state of Massachusetts. Assuming a \$5,000 per year health plan, this translated into an infertility-specific benefit of \$1.71 per month.<sup>12</sup>

In another attempt to quantify the costs of adding an infertility benefit, investigators at the University of Iowa evaluated the health care benefits of the university's employee health care plan from January 1993 to December 1995. The university's health plan had an infertility benefit with coverage for IVF that began in 1990. It consisted of a \$15,000 lifetime maximum per person. This was increased to a \$25,000 lifetime maximum per contract in 1995. Over the 3-year period, infertility costs amounted to 0.79% of total health care costs. The mean per member per month increase in cost of infertility specific care was \$0.67 during the study period. The mean overall per member per month cost of the health plan during that period was \$86.15.<sup>4</sup>

The studies cited herein provide a dollar value in showing what adding an IVF benefit to a health plan would do to an individual member's premiums (Table I). However, it should be noted that others contend that adding an infertility benefit service to health plans would increase the cost per month by \$8.75 to \$14.50.<sup>13</sup> The gap between the per member per month estimates is possibly a reflection of assumptions made in calculating the increase in utilization of IVF services when costs are shifted to a third party. In 1 study, estimates in premium per member per month increased from \$2.79 to \$13.95 when a 500% increase in use of IVF services was noted.<sup>5</sup>

Furthermore, some argue that the cost of adding a particular health care mandate should not be viewed individually but should be viewed in sum. They hold state legislatures accountable for the rising cost of health care due to passage of numerous mandates, noting a >100-fold increase in state-mandated health benefits from 1965 to 1997.<sup>13</sup> These points are commonly cited in opposition of legislation advocating infertility benefits.<sup>13</sup>

Future analysis of the cost of IVF may focus on the resources required to provide IVF services using the relative value unit (RVU), which accounts for physician work, expense to the practice and liability. Utilized by the CMS and private insurers to set physician fees, the RVU is multiplied by a dollar conversion factor that is uniform across all specialties and updated annually by the government. Its ubiquity may lend itself to supplementing future policy discussions regarding insurance coverage

**Table I** Effect on Premium with Addition of IVF Coverage

Authors	Increase/ member/mo	Study design
Stoval et al <sup>4</sup>	\$0.67	University of Iowa self-insurance plan
Griffin et al <sup>12</sup>	\$1.71	Retrospective review of HMO and indemnity plans
Collins et al <sup>5</sup>	\$2.59	Estimate costs of assisted reproductive technologies per yr via polling IVF clinics and estimated increase in premium
National Center for Policy Analysis, Issue Brief <sup>13</sup>	\$14.50	Based on a actuarial analysis assuming a \$3,500 annual health plan

**Table II** Nonfacility Total Relative Value Units (RVUs) for Common Procedure Terminology (CPT) Codes Used by Obstetrician-Gynecologists

Infertility procedure (CPT)	RVU (facility)	Other elective procedure (CPT)	RVU (facility)
Intrauterine insemination (58322)	2.31 (1.58)	Laparoscopic tubal occlusion (58671)	9.63 (9.63)
Oocyte retrieval (58970)	5.95 (5.32)	Laparoscopic fimbrioplasty (58672)	19.69 (19.69)
Embryo transfer (58976)	6.80 (5.97)	Hysteroscopic sterilization (58565)	51.64 (11.84)

2009 Conversion factor = \$36.07.

for IVF services as RVUs for IVF treatments are smaller and therefore may be less costly than other infertility and gynecologic procedures (Table II).<sup>14</sup>

#### *Does Providing Insurance Coverage Affect Multiple Birth Rates?*

By 1998 it had been widely accepted that the increase in the multiple gestation rate in the United States was due to IVF.<sup>15</sup> With the increasing use of IVF and other infertility treatments, the simultaneous increase in the multiple gestation rate has contributed to an increase in the preterm birth rate.<sup>16</sup> In 2005, the "societal/economic burden associated with preterm birth in the U.S was \$26.2 billion."<sup>16</sup> In the United States, between 1980 and 1997, the twin birth rate increased 42%, whereas the triplet birth rate increased 5-fold.<sup>17</sup> Similar trends in Europe have been documented as well.<sup>18-20</sup> From 1997 to 2000, the multiple birth rate remained constant in both Europe and the United States despite efforts to increase awareness regarding the costs and consequences of multiple births.<sup>18</sup> However, during that time, in the United States, the number of embryos being transferred, as well as the number of pregnancies with 3 or more fetuses, declined.<sup>19</sup> In the United States, guidelines promoted by ASRM regarding embryo transfer have helped maintain this trend.<sup>21,22</sup> With attention focused on a rising preterm birth rate and a high multiple gestation rate, a 2002 U.S study suggested that states with mandated IVF services had a lower number of embryos transferred per cycle and a lower higher order multiple gestation rate.<sup>23</sup>

Starting in the early 1990s, European countries, either via the state or the fertility sector, enacted rules regarding the number of embryos that could be transferred.<sup>24,25</sup> In 2003, Belgium passed embryo transfer legislation that made single embryo transfer (sET) compulsory to qualifying patients, due to the risk of high order multiples and the high cost associated with neonatal care.<sup>18</sup> The government concluded that the costs saved from reducing the mul-

tiple birth rate will allow greater access to IVF services.<sup>18</sup> Penalties for not complying with these guidelines may result in loss of license, fines and even imprisonment.<sup>19</sup> Although the ASRM guidelines are followed by most clinics in the United States, the decision about the number of embryos transferred is ultimately left to the patient and the physician.<sup>19</sup>

Belgium's embryo transfer policy is unique in that its guidelines are compulsory for certain patients who are seeking IVF through the state's program. Although states have stipulations regarding the number of cycles allowed or a maximum dollar amount that can be covered, to our knowledge, no such embryo transfer policy exists between payers and providers in the United States. One may assume, however, that if a national mandate were enacted, third party payers could consider precertifying the number of embryos transferred.

#### *What Effect Might Mandated Coverage Have On Number of Cycles and Cost of IVF Services?*

Since the CDC began reporting trends in IVF services in 1996, the number of cycles has increased 2-fold.<sup>2</sup> Additionally, in states in which coverage was mandated, an increase in the number of cycles performed was observed.<sup>23</sup> The cost range of IVF services, however, seems to have been relatively stable since 1995, with range estimates affected by region and whether or not cost of medications is included.<sup>5,7,8</sup> Traditional market forces regarding demand for IVF services may be confounded by evidence that patients who desire IVF are willing to pay 10-100-fold more than the actual cost of a cycle in order to achieve pregnancy.<sup>26</sup>

As utilization of IVF services increases, total cost of providing services can be affected as well. Fixed costs (i.e., cost to maintain the temperature in the laboratory, the rent of the building, insurance and advertising) will not be initially affected by the proportion of services rendered, but the variable and marginal costs of providing IVF services will in-

crease in proportion to utilization. For example, as more patients seek IVF services, more ultrasounds will be performed, which may require additional ultrasound machines and/or additional ultrasonographers. More egg retrievals and embryo transfers will be performed, which may require more laboratory equipment and embryology personnel to accommodate the demand.

If coverage were mandated, utilization may increase, thus leading to more IVF procedures performed. Initially, the marginal costs to provide the services may actually decrease, perhaps leading to decreased charges to the patient. However, if an increase in IVF services reaches a certain threshold in which an additional ultrasound, more personnel to manage a larger work force or the expense of a new operating room were required, then the total cost of the IVF services may be affected by these marginal costs.

In order to control or reduce the cost of IVF services with increasing utilization, volume efficiency and perhaps protocol changes may be helpful.<sup>5</sup> Proponents of mandated coverage suggest that cost per IVF service will be reduced as clinics and HMOs would be able to negotiate provider agreements that lower fees and other services for increased volume and utilization of each clinic.<sup>27</sup> Lower dose protocols for ovulation induction have been reported to reduce the cost of IVF services due to decreased cost of medications without statistically affecting the overall pregnancy rate.<sup>28</sup> Another strategy reported to reduce out-of-pocket patient cost has been the use of satellite clinics for ovulation induction.<sup>29</sup>

Ultimately, providing insurance coverage for IVF has been widely debated since its introduction in 1978. The discussion coincided with recognition of the overall rising cost of health care and the growing cost of insurance premiums. In 1987, the state of Massachusetts enacted legislation that recognized infertility as an illness and required insurance coverage for infertility related medical services,<sup>12</sup> and since then 14 additional states have adopted laws regarding insurance coverage of IVF.<sup>30</sup>

### **Discussion**

Today, as health care policy recaptures the national spotlight, addressing the impact of mandated benefits on access becomes relevant. The reason most often cited for not seeking advanced infertility care is lack of affordability.<sup>31</sup> Furthermore, cost is often quoted as being the biggest obstacle for employers

to provide coverage; however, in a survey of 930 employers with > 200 employees, 91% reported that IVF coverage did not result in a significant increase in health plan costs.<sup>32</sup> Proponents of mandated coverage cite these employers' experiences in support of past studies suggesting the addition of coverage of IVF services has a negligible impact on total health care expenditures and therefore increases access to the service.<sup>4-8,11,12,33</sup>

In the absence of coverage, however, some providers are confronting these obstacles by offering risk sharing arrangements with patients undergoing IVF, so-called pregnancy guarantees. These programs tend to be reserved for patients with a high likelihood of pregnancy with IVF and offer a money back guarantee if pregnancy is not achieved. Proponents of these plans suggest that these contracts provide a legitimate solution to the high costs and the lack of insurance coverage for IVF for patients.

A recent ASRM Ethics Committee report concluded that these programs are "ethically acceptable," noting that programs do a sufficient job of providing patients with information in order to make an informed decision regarding purchase of such contracts. However, programs should carefully counsel qualifying patients that they are good candidates for IVF and may not require purchase of such plans.<sup>34</sup>

Recent reports seem to suggest, however, that the addition of a mandated benefit does not guarantee greater access, nor does it improve disparities in access to fertility services among different races, ethnicities or socioeconomic groups.<sup>35,36</sup> More investigation is needed to further elucidate the impact of access in states where mandated coverage is present.

Simply mandating an employer to provide health coverage does not necessarily guarantee coverage, either. Employers who self-insure may be exempt from state laws mandating coverage. A federal statute known as the Employee Retirement and Security Act (ERISA) regulates operation of an employer benefits plan. Because ERISA preempts any state law related to employee health coverage among those who self-insure, many providers of health benefits coverage are not required by state law to provide an IVF benefit.<sup>37</sup> In recent years many employers have transitioned to self-insuring their employees, citing, among others, ERISA status and thus exemption from state mandates.<sup>38</sup> Large employers tend to self-insure; therefore many em-

ployees who work for these companies may not benefit from state mandates that expand health care coverage.

Although laws in states with mandated benefits for infertility coverage vary, mandates may introduce a role for third parties to influence the delivery of IVF services. One example may develop from a pay-for-performance model, which may add incentive to particular outcomes. Another example may be the implementation of a type of prior authorization before starting an IVF treatment cycle. Although negatively viewed by many physicians as a managed care tool that impacts the patient-physician relationship,<sup>39</sup> evidence from other areas of health care delivery indicates that systems that use prior authorizations may help educate physicians about practice guidelines.<sup>40</sup> States with mandates have already been shown to have a lower embryo transfer/cycle rate and a resulting lower multiple gestation rate. It is believed that practitioners in these states face less patient pressure to transfer multiple embryos, given that additional IVF cycles, if needed, would be covered.<sup>23</sup> Additionally, implementing mandates may encourage greater utilization of single embryo transfer, which has been noted to reduce the likelihood of twin gestations without compromising pregnancy rate.<sup>41,42</sup>

The various viewpoints regarding the societal impact of IVF utilization and coverage warrants mention as this often results in sharing of costs among those without infertility concerns. The first large survey to gauge public opinion regarding infertility and IVF was performed in 2000. Seven thousand adults >15 years old, representing 6 European countries and the United States were polled. Each response was weighted based on the population size of the country. When asked if IVF should be reimbursable, 70% of total respondents said "yes." Sixty-six percent of respondents in the United States said "yes" to this question, with the highest "yes" response coming from France, with 81%.<sup>43</sup>

Of note, when asked whether infertility was a disease, 53% of total respondents "disagreed." Within the United States, 60% of respondents "disagreed" with the statement, while 17% "could not say." Some suggest that the lack of reimbursement for infertility treatment reinforces the public's opinions regarding this statement, while others suggest that the connotation of the word "disease" in the English language may contribute to differences between English and non-English-speaking respondents.<sup>43</sup>

Proponents of mandated benefits also cite a 2002 Harris Interactive Poll in which 80% of the general public believed that infertility diagnosis and treatment should be covered by health insurance, and concluded that an overwhelming majority would not protest mandated coverage.<sup>32</sup> Others counter that the societal cost of covering IVF services goes beyond a negligible increase in premiums. Employers would be asked to cover a service that is expensive, thus driving up health care costs for the employer. In times of economic hardship, some employers may find it difficult to justify certain health benefits.

Although recent data may not be convincing with regard to increasing access of care, several reports suggest that the actual cost of adding an IVF benefit may not undermine an employer's overall cost of providing a health care benefit to its employees.<sup>4-8,11,32</sup>

The analysis presented serves to review the milestones in the brief history of IVF service utilization and cost analysis in the United States. The rise in utilization of IVF services suggests an increasing recognition of infertility among individuals and/or couples, perhaps as a reflection of an increasing trend in many cultures to delay childbearing. In our review, many of the studies analyzing cost were performed 10–15 years ago. As both economic and social forces continue to change, estimating the true cost of IVF will evolve as utilization of IVF services increases. We think that it is worth revisiting the actual costs and cost analyses of this growing medical technology in light of current trends of use, especially as the total of states with mandated coverage now includes New Jersey and Connecticut, two population-dense regions of the United States. Interestingly, a recent report utilizing Treasury Department statistical methods suggests that reducing barriers to IVF services might achieve demographic and economic goals, particularly in countries where the mortality rate outpaces birth rate.<sup>44</sup> Ultimately, future studies that compare (1) real cost data, (2) the impact of access cost, and (3) pregnancy and multiple-gestation rates in states with mandated benefits and those without will help guide future policy regarding IVF delivery in the United States.

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