The economic cost of infertility-related services: an examination of the Massachusetts infertility insurance mandate

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Objective: To examine the costs and outcomes of infertility-related services in Massachusetts during a time of expanded use of assisted reproductive technology (ART).

Design: Cost data were obtained from the Massachusetts Department of Insurance Rate-Setting Commission and 9 large group insurance plans for the period 1986–1993. Utilization and success rates of ART were examined, and the cost per live delivery with the use of ART in 1993 was estimated.

Setting: The state of Massachusetts, in which access to infertility-related services has been mandated by law since 1989.

Patient(s): The study population consisted of 8 large health maintenance organization plans and the Blue Cross/Blue Shield indemnity plan.

Intervention(s): None.

Main Outcome Measure(s): Per capita infertility-related expenditures, infertility-related expenditures as a percentage of total expenditures, live deliveries per initiated ART cycle, and cost per live delivery.

Result(s): Expenditures for infertility services increased at a rate similar to or slower than inflation during the years 1988–1992. Increases were slowest in health maintenance organizations, probably as a result of provider arrangements. Infertility services accounted for 0.41% of total expenditures within the indemnity plan in 1993 (approximately $1.71 per contract-month). Examination of ART utilization showed no evidence of overutilization by patients with a low chance of success. The cost per live delivery with the use of ART in 1993 was $59,484.

Conclusion(s): Mandated infertility coverage was associated with increased use of ART but not with excessive increases in consumer cost for infertility insurance coverage. (Fertil Steril 1998;70:22–9. ©1998 by American Society for Reproductive Medicine.)

Key Words: Infertility, insurance, IVF, in vitro fertilization, IVF registry, HMO

The cost of medical care in the United States currently accounts for approximately 13% of the gross national product, or about $1 trillion (1). Policy makers, economists, medical professionals, and bioethicists have become increasingly concerned over the high rate of medical cost inflation during the past decade (2). This concern has led to debate on a fundamental question in health care policy: can we as a nation increase access to health care or must we move toward rationing of health care (3)?

One area of medical care that often is included in a discussion of rationing is the diagnosis and treatment of infertility, especially the treatment of infertility with the use of IVF and related assisted reproductive technologies (ARTs) (4, 5). Recently, Neumann et al. (6) attempted to quantify the economic impact of IVF services by estimating the cost per live delivery with the use of this technology. Their estimated cost per live delivery ranged from a base estimate of $66,667 (base case assumptions, success in the first IVF cycle) to a high estimate of $800,000 (base case cost assumption for women >40 years old with accompanying male factor infertility, success in the fifth IVF cycle). An alternative approach to estimating the medical cost of IVF focuses on the cost of providing insurance coverage for these services within group insurance plans (7). This estimate, based on current utilization of IVF on a national basis, suggests that the monthly cost of providing insurance coverage for IVF ser-
services is approximately $0.26, or less than 0.1% of the total health care premium in the typical family health care benefits plan.

Each type of cost model has strengths and weaknesses. The model used by Neumann et al. (6) provides a baseline estimate of the cost of successful treatment of infertility with the use of IVF. However, it is important to compare these estimates with actual costs for a variety of treatments. Analysis of actual expenditures suggests that the model used by Neumann et al. (6) overestimates the cost of a successful delivery using IVF (8), and comparative cost analyses have suggested that IVF is cost-effective compared with alternative therapies such as tuboplasty (9). Alternatively, models of the cost of providing insurance coverage for IVF services in isolation cannot incorporate either cost savings when IVF replaces less effective therapies or cost increases when IVF is added to a health benefits plan. This is especially important, given that data from other countries strongly suggest that IVF utilization increases when these services are added to health benefits plans (10).

Regardless of the usefulness of either type of cost estimate for IVF services (cost per live delivery versus cost of providing insurance coverage), it is important to consider the economic costs of the full range of infertility-related health services (diagnostic procedures, conventional interventions, and ART). The number of individuals seeking infertility-related services has increased substantially during the past 20 years (11), and there have been parallel advances in infertility treatment options (12, 13).

Expenditures for infertility services were estimated to account for 1% of reproduction-related health care expenses in 1982, or about $3.29 for each woman between the ages of 15 and 44 years during that year (14). In addition, with the use of 1984 data on typical infertility service charges, it was estimated that the cost per successful treatment of infertility was $10,700; the cost per successful treatment of tubal factor infertility was substantially higher ($31,841) (15). Both these cost estimates were published before the widespread use of ART and the enactment of state mandates to regulate access to ART within health care plans.

The purpose of the current investigation was to document trends in the economic cost of providing comprehensive infertility services within group insurance plans. Data from 9 large insurance plans in Massachusetts were analyzed to determine the total cost of providing coverage for the disease of infertility. Corrections for inflation in the medical sector and changes in the market share of the plans were used to document inflation-adjusted cost changes for infertility services.

Additional data provided to the Insurance Commission by Blue Cross/Blue Shield of Massachusetts were used to illustrate the consumer cost of providing comprehensive coverage for infertility within the Blue Cross/Blue Shield of Massachusetts indemnity plan as a percentage of total health care expenditures. The patient characteristics and success rates for ART services within Massachusetts also were examined with the use of the 1993 IVF registry (16). This was done so that the relation between mandated coverage for ART procedures and the use of these procedures could be examined. Finally, the cost per live delivery with the use of ART in Massachusetts was estimated.

**MATERIALS AND METHODS**

We examined infertility cost data from Massachusetts because of the comprehensive infertility treatment mandate in that state. In October 1987, the Massachusetts legislature enacted “An Act Providing a Medical Definition of Infertility,” essentially clarifying that infertility is an illness requiring coverage by insurance after 1988 (17). We will refer to this as the “Mandate.” In effect, the Mandate requires insurance providers to cover infertility-related medical services to the same extent as pregnancy-related services (i.e., parity in coverage for hospital charges, physician fees, drug charges, co-payments, and deductibles). The Mandate does not require coverage for experimental procedures, surrogacy, reversal of voluntary sterilization, or procurement of donor gametes (fertilization and transfer of donor gametes are covered procedures, and intracytoplasmic sperm injection [ICSI] is now a covered procedure under the Mandate).

We initially sought a database that would allow examination of Current Procedural Terminology (CPT) codes during the years before and after the Mandate was passed. Unfortunately, these codes were not uniformly available across a wide range of health care plans. An alternative database was identified. The Massachusetts Department of Insurance Rate-Setting Commission collects diagnostic code data on disease. Infertility related codes are part of that database. Their hospital cost data were broken down by public and private payers, with the private sector market divided by indemnity (predominantly Blue Cross/Blue Shield of Massachusetts) and health maintenance organization (HMO) plans, as well as self-insured entities. Medicare, Medicaid, and self-insured plans were excluded from further consideration because those plans are not required to comply with state-legislated health insurance mandates.

The first investigator on this study, along with the Rate-Setting Commission, arranged relevant primary and secondary International Classification of Diseases-9 (ICD-9) codes based on available data that linked CPT and ICD-9 codes. These codes included male factor infertility codes (i.e., 606.x), female factor infertility codes (i.e., 628.x), and endometriosis (i.e., 617.x), as well as codes that may be related to infertility such as prostatitis (i.e., 601.x), ovarian, tubal, pelvic, uterine, or cervical inflammation (i.e., 614.x), non-inflammatory disorders (620.x), and codes such as malposition of the uterus (621.6), stricture and stenosis of the cervix (622.4), and pelvic congestion syndrome (625.5).
These codes were reviewed and judged to be relevant to the diagnosis of infertility by several Massachusetts physicians with well-established infertility practices. We attempted to develop a liberal definition of infertility-related services in selecting ICD-9 codes so that the data would be biased toward an overestimation of the economic cost of comprehensive infertility benefits. For example, codes for endometriosis were included, even though we were not able to exclude cases in which the women were not seeking infertility treatment.

In 1992, the Blue Cross/Blue Shield of Massachusetts indemnity plan, HMOs, and Preferred Provider Organizations (PPOs) covered approximately 32%, 33%, and 3% of insured Massachusetts residents, respectively. Because of the low number of PPO plans, these data were excluded from further analysis, resulting in a study population that represented approximately 65% of the privately insured population of Massachusetts. From this population, the total annual expenditures for the relevant ICD-9 codes of 8 large HMO plans and the Blue Cross/Blue Shield of Massachusetts indemnity plan were sampled. These plans were selected because, taken together, they reported relevant data to the Massachusetts Department of Insurance for each year from 1986–1993 (data from 1992 were incomplete, however, requiring us to interpolate from the 1991 and 1993 data).

Aggregating across plans, this resulted in an average plan enrollment of 242,481 members in 1991, and the HMO plans that were sampled represented approximately 75% of the HMO market share in that year. Data were not available for each HMO plan for proprietary reasons; rather, the Massachusetts Department of Insurance supplied summary statistics for the 8 HMO plans. Thus, the term “HMO plans” refers to the aggregate of these 8 plans.

All expenditures related to ICD-9 diagnostic codes for infertility-related services were summed within the 2 insurance groups (HMOs and the Blue Cross/Blue Shield of Massachusetts indemnity plan). Data for the years 1986 and 1987 were included so that costs before the enactment of the Mandate could be examined. Expenditures in the years 1987 through 1993 were corrected for inflation based on the regional Health Care Consumer Price Index (18) so that the rate of medical inflation for infertility treatment relative to the general rate of medical inflation could be examined. The annual rates of medical inflation in the years 1987, 1988, 1989, 1990, 1991, 1992, and 1993 were 5.1%, 9.4%, 9.2%, 10.6%, 12.4%, 9.8%, and 6.5%, respectively.

These analyses were repeated separately for the aggregate HMO plans and the Blue Cross/Blue Shield of Massachusetts indemnity plan because of the substantial difference in the proportion of members between 15 and 44 years old in the 2 groups (56% and 38%, respectively, in 1993). The market share of the HMO plans increased from 22% to 33% between 1988 and 1992, whereas the market share of the Blue Cross/Blue Shield of Massachusetts indemnity plan decreased from 51% to 32%. We corrected for changes in market share between 1988 and 1992 so that trends in per capita expenditures could be examined. Unfortunately, year-by-year market share statistics were not available; thus, we could only examine per capita expenditure changes from 1988–1992.

Total expenditures for the Blue Cross/Blue Shield of Massachusetts indemnity plan, provided by the Massachusetts Department of Insurance, were used to calculate consumer costs for infertility services as a percentage of total monthly health care premiums. Total expenditures were not available for the aggregate HMO plans, so costs as a percentage of total expenditures could not be calculated for this group.

The clinic-specific reports to the IVF registry for 1993 were used to document ART utilization, patient characteristics, and success rates for ART in Massachusetts. All IVF and GIFT cycles performed at the 9 Massachusetts clinics that reported to the IVF registry were tabulated and grouped according to the age of the woman (<40 years versus ≥40 years) and the presence or absence of male factor infertility.

The overall success rates and the relative proportions of initiated cycles and success rates for the 4 resultant patient groups then were compared with those of the rest of the United States and Canada by subtracting the Massachusetts clinic-specific data from the 1993 IVF registry summary data (the IVF registry summary data were converted to the metric of live delivery per initiated cycle by multiplying the delivery/retrieval success rate by the probability of an initiated cycle reaching egg retrieval). This allowed for statistical comparisons of patient characteristics and success rates between Massachusetts and the remainder of the IVF registry database.

We also used the clinic-specific data on IVF, GIFT, zygote intrafallopian transfer (ZIFT), and cryopreserved egg transfers to estimate the cost per live delivery in Massachusetts with the use of ART. For the purposes of these analyses, we estimated the cost of IVF, GIFT, ZIFT, and cryopreserved egg transfer cycles to be $8,000, $8,000, $10,000, and $2,000, respectively, based on published cycle cost data (6–8).

**RESULTS**

Table 1 illustrates trends in the total economic cost of infertility-related services within the Blue Cross/Blue Shield of Massachusetts and HMO plans in the years 1986–1993. In both types of insurance plans, most of the expenditures were for endometriosis and “other codes”; primary and secondary diagnostic codes for male factor and female factor infertility accounted for no more than 12% of all infertility-related codes between 1986 and 1993. Further, the proportion of dollars spent within each diagnostic code category was relatively constant, both across plans and across the years.
1986–1993. The exception was female factor infertility codes, which showed decreases as percentages of total infertility-related codes in both types of insurance plans.

Corrections for changes in market share and for the rate of medical inflation between the years 1988 and 1992 were calculated to compare expenditures within the Blue Cross/Blue Shield of Massachusetts indemnity and HMO plans. After these corrections, the Blue Cross/Blue Shield of Massachusetts plan showed annual increases in the cost of providing infertility services on a per capita basis of +0.2% more than inflation between 1988 and 1992. The corrections resulted in a −4.1% annual decrease in the cost of infertility services on a per capita basis between 1988 and 1992 in the HMO plans.

Next, the total expenditure for infertility services within the Blue Cross/Blue Shield of Massachusetts plan was divided by the total health care expenditure for each year from 1986–1993 to derive the cost of insurance coverage for infertility services (the 1992 data were interpolated because of incomplete reporting). The results of these analyses are listed in Table 1.

In 1986, the expenditure associated with all relevant ICD-9 codes accounted for approximately 0.81% of the total expenditure within the Blue Cross/Blue Shield of Massachusetts plan. This percentage decreased each year until 1990, when the percentage increased slightly relative to 1989. However, the percentage then decreased again in 1991 and 1993; in 1993, the expenditure for the infertility-related codes was approximately 0.41% of the total expenditure within the Blue Cross/Blue Shield of Massachusetts plan. Within a $5,000-per-year health care insurance policy, this would translate into approximately $1.71 per month for infertility insurance coverage. Comparable analyses were not possible for the HMO data because the total expenditures within these plans were not provided by the Rate-Setting Commission for proprietary reasons.

Next, we examined patient characteristics and success rates for those couples who used IVF and GIFT. Using the summary report of the IVF registry for 1993 (16), we calculated the number of IVF and GIFT cycles initiated by dividing the number of cycles that reached the retrieval stage by the probability of a cycle reaching the retrieval stage. Using the clinic-specific IVF registry information, we subtracted the number of IVF and GIFT cycles initiated in Massachusetts from the 1993 summary report data. The proportions of couples in each of 4 groups, based on the age of the woman and the presence of male factor infertility, were contrasted (Table 2).

The results showed that proportionally fewer couples in which the woman was ≤39 years old and male factor infertility was not present received IVF and GIFT services within Massachusetts, relative to the rest of the United States and Canada. In addition, proportionally more couples in which the woman was ≥40 years old received IVF and GIFT services in Massachusetts, relative to the rest of the United States and Canada.

In 1993, the combined success rate of IVF and GIFT procedures per initiated cycle within Massachusetts (14.3%) was significantly lower than that in the rest of the United States and Canada (17.8%; $\chi^2 = 27.33, P < 0.001$). Examination of success rates for the 4 IVF and GIFT patient groups showed that this lower success rate was accounted for by a lower success rate in the group of couples in which the woman was <40 years old and male factor infertility was not present (Table 3). There were no statistically significant differences in the success rates in the other 3 patient groups.

**TABLE 1**

Infertility-related expenditures in thousands of dollars for the Blue Cross/Blue Shield of Massachusetts indemnity and HMO plans from 1986–1993 and the percentage of total infertility-related expenditures within each of 4 diagnostic categories.

<table>
<thead>
<tr>
<th>Year</th>
<th>Male factor infertility</th>
<th>Female factor infertility</th>
<th>Endometriosis</th>
<th>Other conditions</th>
<th>Infertility-related expenditures as a percentage of total expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Blue Cross/Blue Shield of Massachusetts plan</td>
</tr>
<tr>
<td>1986</td>
<td>1,037 (6)</td>
<td>1,004 (5)</td>
<td>8,534 (46)</td>
<td>7,896 (43)</td>
<td>0.81</td>
</tr>
<tr>
<td>1987</td>
<td>1,196 (7)</td>
<td>799 (4)</td>
<td>7,968 (46)</td>
<td>7,435 (43)</td>
<td>0.71</td>
</tr>
<tr>
<td>1988</td>
<td>1,069 (7)</td>
<td>665 (4)</td>
<td>7,512 (46)</td>
<td>6,947 (43)</td>
<td>0.61</td>
</tr>
<tr>
<td>1989</td>
<td>1,178 (7)</td>
<td>775 (5)</td>
<td>7,409 (47)</td>
<td>6,400 (41)</td>
<td>0.54</td>
</tr>
<tr>
<td>1990</td>
<td>1,095 (6)</td>
<td>607 (4)</td>
<td>8,165 (47)</td>
<td>7,367 (43)</td>
<td>0.55</td>
</tr>
<tr>
<td>1991</td>
<td>1,225 (8)</td>
<td>467 (3)</td>
<td>7,715 (50)</td>
<td>6,122 (39)</td>
<td>0.49</td>
</tr>
<tr>
<td>1992</td>
<td>1,034 (7)</td>
<td>401 (3)</td>
<td>7,250 (48)</td>
<td>6,271 (42)</td>
<td>0.45</td>
</tr>
<tr>
<td>1993</td>
<td>842 (6)</td>
<td>334 (2)</td>
<td>6,784 (47)</td>
<td>6,419 (45)</td>
<td>0.41</td>
</tr>
</tbody>
</table>

*Note: All values are dollar amounts with percentages given in parentheses. Dollar amounts are not corrected for inflation or market share. The data for 1992 are interpolated from the data for 1991 and 1993. Infertility expenditures as a percentage of total expenditures were not available for the HMO plans.*
Finally, we estimated the cost per live delivery in Massachusetts for the year 1993 (Table 4). Clinic-specific data from the IVF registry showed that 2,942 IVF cycles, 564 GIFT cycles, and 12 ZIFT cycles were initiated in the 9 IVF clinics that reported to the IVF registry. In addition, 591 cryopreserved egg transfer cycles were attempted. Overall, the estimated cost per live delivery was $59,484; the cost was somewhat higher for IVF cycles ($69,448) than for GIFT cycles ($49,469). None of the 12 ZIFT cycles performed in Massachusetts in 1993 were successful, according to the clinic-specific IVF registry report. Although cryopreserved egg transfer cycles were less successful than IVF cycles overall, the lower cost per cycle resulted in a net cost savings when fresh and cryopreserved egg transfer cycles were considered together.

We also examined the cost per live delivery for the 4 patient groups described in Tables 2 and 3. The cost per live delivery was lowest in the group of couples in which the woman was ≤39 years old and male factor infertility was not present ($47,677) and somewhat higher in the group in which the woman was ≤39 years old and male factor infertility was present ($58,323). The cost per live delivery was substantially higher in the group of couples in which the woman was ≥40 years old and male factor infertility was not present ($100,000) and in the group in which the woman was ≥40 years old and male factor infertility was present ($106,667).

These cost estimates reflect neither additional costs resulting from medical complications or multiple gestations nor cost savings resulting from cancelled cycles or capitation arrangements between clinics and insurance plans. In addition, these cost estimates include data on all ART cycles reported to the IVF registry, regardless of the level of insurance coverage.

**DISCUSSION**

The goals of this study were to examine the costs and utilization of medical services for infertility within the context of group health insurance plans and mandated access to all forms of medically indicated, nonexperimental treatment. Analysis of total expenditures for infertility-related services within 9 large insurance plans showed that expenditures increased during a time when insurance coverage was extended to many individuals. Correction of these data for the general rate of medical inflation and for changes in the market shares of these plans showed that the rate of change in infertility-related expenditures was dependent on the type of insurance plan. The Blue Cross/Blue Shield of Massachusetts indemnity plan showed a slight increase in per capita expenditures, whereas the HMO plans showed an inflation-corrected decrease in per capita expenditures.

Taken together, these results show that the rate of change in infertility-related expenditures on a per capita basis varied...
substantially between the Blue Cross/Blue Shield of Massachusetts indemnity and HMO plans within Massachusetts. It is noteworthy that per capita expenditures decreased in the HMO plans, even though these plans enrolled a higher percentage of women in their childbearing years.

These inflation-adjusted trends in infertility-related expenditures occurred during a period of substantial expansion of ART services in Massachusetts. The number of clinics reporting to the IVF registry in Massachusetts increased from 1 clinic in 1985 to 9 clinics in 1993 (17, 19). Examination of the clinic-specific IVF registry report suggests that, although Massachusetts accounts for only 2.3% of the population of the United States (20), approximately 10% of the IVF and GIFT procedures performed in the United States and Canada each year are performed in Massachusetts. Overall, the utilization of ART services in Massachusetts, on a per capita basis, was substantially higher than in the rest of the United States and Canada in 1993 and was similar to the level of utilization in France (7). This raises the question of why infertility-related expenditures have increased at a rate slower than inflation within the HMO plans, particularly when those plans have many more young members who are likely to use infertility-related services in general and ART in particular.

There are numerous possible reasons why costs within the HMO plans have been decreasing relative to the rate of inflation. Most infertile couples are treated using low-cost, conventional interventions (12, 13). The cost increases for these interventions probably have lagged behind the general rate of medical inflation because most of the interventions are performed on an outpatient basis with the use of available technology. Most of the components of ART (i.e., ultrasound, blood assays, laparoscopic surgery, medications) also are established technologies that probably have not increased in cost at a rate any higher than the general rate of medical inflation. Finally, the Massachusetts Mandate has been amended to include new technologies, such as ICSI, that appear to be cost-effective relative to IVF in the treatment of severe male factor infertility (21).

Some cost savings may be due to the increased success rates of ART procedures. To examine this possibility, we estimated the success rate for IVF based on the 1985–1986 summary report of the IVF registry and compared this with the 1993 success rate data. From 1985–1993, the success rates of IVF procedures, expressed in terms of live deliveries per initiated cycles, have nearly tripled, from an estimated 5.4% in 1985 to 16% in 1993. Additional economic gains may be attributed to the use of other ART procedures, such as GIFT and cryopreserved IVF cycles (8), as well as to improved treatment protocols that have reduced cycle cancellation rates (12). Some cost savings may have accrued because ART replaced alternative therapies, such as tuboplasty (9).

Perhaps the most important cost-saving measure, however, was provider arrangements and capitation plans within the HMO groups that led to substantial discounts for infertility-related services in general and ART services in particular within Massachusetts (22). This may be the reason why per capita infertility-related expenditures have been increasing at a rate lower than inflation within the HMO plans but at a rate slightly higher than inflation within the Blue Cross/Blue Shield of Massachusetts plan.

In terms of cost to the consumer for infertility insurance, the data suggest that expenditures for all services that may be related to the diagnosis and treatment of infertility were approximately 0.8% of total expenditures within the Blue Cross/Blue Shield of Massachusetts plan before the Mandate. This cost decreased at a stable rate through 1993, when the cost of all services was approximately 0.4% of the total expenditures within the Blue Cross/Blue Shield of Massachusetts plan. Much of this decline can be attributed to the shift of younger individuals who were more likely to use infertility-related services toward the HMO plans.

It also should be noted that these statistics include all expenditures associated with the diagnosis and treatment of endometriosis; we believe that 0.41% is an upper-limit estimate of the cost of providing infertility-related services within the Blue Cross/Blue Shield of Massachusetts plan. Unfortunately, we were unable to obtain total health care expenditure data from the HMO plans. We speculate that infertility-related expenditures are lower in the HMO plans because of capitation arrangements, but more research needs to be done in this area.

For both the Blue Cross/Blue Shield of Massachusetts indemnity and HMO plans, the proportion of infertility-related expenditures attributable to male factor and female factor infertility diagnostic codes was <15% of the total infertility-related expenditures for the years 1986–1993. This stable, low proportion of male and female factor infertility diagnostic code expenditures relative to endometriosis and other diagnostic code expenditures can be interpreted in two ways.

Before the enactment of the Mandate, there was concern

### Table 4

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. of initiated cycles</th>
<th>No. of live deliveries</th>
<th>Cost per delivery (U.S.$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVF</td>
<td>2,942</td>
<td>386</td>
<td>69,448</td>
</tr>
<tr>
<td>GIFT</td>
<td>564</td>
<td>114</td>
<td>49,449</td>
</tr>
<tr>
<td>ZIFT</td>
<td>12</td>
<td>0</td>
<td>—</td>
</tr>
<tr>
<td>Cryopreservation</td>
<td>591*</td>
<td>74</td>
<td>15,500</td>
</tr>
<tr>
<td>Total</td>
<td>574</td>
<td>59,484</td>
<td>59,484</td>
</tr>
</tbody>
</table>

Note: Estimates assume an average cost of $8,000, $8,000, $10,000, and $2,000 for IVF, GIFT, ZIFT, and cryopreservation attempts, respectively. * No. of attempted embryo thawings.
that many costs of infertility treatment were hidden through “creative coding” (23). This would suggest that, once the Mandate was in effect, there would be an increase in the use of male and female factor infertility diagnostic codes. The lack of such an increase could be interpreted as evidence against the widespread use of “creative coding” before the Mandate. Alternatively, it may be that, before the Mandate, physicians were using ICD-9 codes that were more likely to be reimbursed by insurance plans. These physicians may have continued their diagnostic labeling out of simple habit.

Future research examining the relations between diagnostic and procedural codes would help to clarify the extent to which endometriosis and other diagnostic codes examined in the current study reflect infertility-related services versus services that are not attributable to the treatment of infertility. In addition, more detailed examination of the links between diagnostic and procedural codes would help to quantify the effect of expanded ART services on the utilization of alternative treatments such as tuboplasty and would further our understanding of the cost-effectiveness of a wider range of specific infertility treatments.

Success rates of ART procedures vary by patient characteristics such as the age of the woman and the presence of male factor infertility (16). In examining the Massachusetts clinic-specific data from 1993, however, it does not appear that selection of patients on the basis of positive prognostic indicators occurs in Massachusetts. In fact, the data support the opposite; proportionally more older women undergo IVF and GIFT procedures in Massachusetts than in the rest of the United States and Canada (Table 2). In examining success rates for these various patient groups, however, it appears that the higher use of IVF and GIFT by older women has not resulted in a lower success rate in Massachusetts than in the rest of the United States and Canada (Table 3).

Taken together, the data suggest that although more older women are receiving ART services in Massachusetts, these women are not using these services to the extent that success rates are being adversely affected. At the same time, success rates in Massachusetts are lower among those couples in which the woman is <40 years old and male factor infertility is not present. The reason for this cannot be discerned from our data, but it should be examined by fertility specialists in Massachusetts.

These analyses, contrasting Massachusetts IVF registry data with the remainder of the United States and Canada, are based on the assumption that clinics that did not report data to the Society for Assisted Reproductive Medicine registry in 1993 were not atypical in their size or success rates (16). Finally, it will be useful to break down the actual cost per live delivery data according to the level of insurance coverage; it is possible that the cost per live delivery is higher for couples who have greater access to ART through health insurance coverage.

In the future, health care policymakers may turn toward the rationing of services as an approach to containing medical costs. Infertility-related services often have been targeted for such rationing. Ideally, the rationing of infertility treatment should be examined in the context of clinical trials that use random assignment to alternative treatments so that extraneous factors can be controlled while cost comparisons are made among a wide range of treatments. In the absence of such research, the cost of infertility treatment must be estimated from available data on patient charges, success rates, utilization, and insurance expenditures.

The available data indicate that the consumer savings in terms of reduced insurance premiums that would result from benefit limits on infertility-related services would be small relative to total premiums. Possible adverse effects of rationing also should be considered. Rationing of diagnostic procedures could delay the treatment of endometriosis and other reproductive problems that, if treated early, could prevent future infertility-related expenditures. Much of the cost of infertility treatment is incurred for conventional therapies; limiting the use of these therapies could push couples toward the use of ART prematurely.

Limiting access to ART could result in overutilization and waste of conventional treatment resources such as tuboplasty. Finally, limiting the number of ART attempts could motivate clinics to maintain policies of transferring numerous embryos as a way of increasing success rates for couples who cannot afford numerous ART attempts. Thus, limits on ART cycles could inadvertently maintain high rates of multiple births and the associated medical complications and economic costs of these births (24).

Ultimately, consumers will request insurance coverage for infertility treatment based on their level of risk (11), knowledge of treatment options (13) and success rates (16), knowledge of treatment costs (6, 15), and knowledge of insurance costs (7, 14). We assert that consumers will make more competent decisions when they are educated as to the incremental cost of providing insurance coverage for infertility services (25). We hope that the data presented here will advance the discourse on the economic impact of infertility benefits within group health care insurance plans.

References