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Cost considerations with infertility therapy: outcome and cost comparison between health maintenance organization and preferred provider organization care based on physician and facility cost

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Of 98 retrospectively selected patient couples insured under one scheme (group I) who, based on performance of a hysterosalpingogram (HSG), were assumed to be under active infertility care, 96 were confirmed as infertile. These were matched by date, patient age and time of HSG to 96 patients under infertility care (group II). Both patient populations were then prospectively evaluated for outcome and cost of treatment. Total physician charges for groups I and II were similar. However, charges per achieved clinical pregnancy were higher in group I than group II since group I patients demonstrated a lower pregnancy rate (28/96, 29%) than group II patients (41/96, 43%) ($P = 0.05$). Within group I, pregnancy rates were identical, whether treatment was provided by generalists or subspecialists. In group II, all care was provided by specialists. The number of days of treatment did not vary between groups I and II, though generalists in group I provided significantly fewer treatment days than specialists in either group I ($P = 0.003$) or in group II ($P = 0.021$). This was primarily due to a significantly higher patient drop-out rate in group I patients, and especially amongst those who received care from generalists ($P < 0.0019$). Group I patients also encountered significantly more surgical procedures than group II patients ($P = 0.0016$). If physician charges are discounted and customary surgical facility costs are added, the actual cost structure for fertility care in group I patients was dramatically higher than in group II patients. The most cost-effective format to provide infertility care of high quality appears to be a managed care setting in which subspecialists provide a majority of care and in which patient choice is restricted to those subspecialists.

Key words: cost containment/infertility/managed care/outcome assessment

Introduction

Medicine as a whole is currently attempting to define the most cost-effective ways to deliver high-quality care (Schwartz and Mendelson, 1991). In the field of infertility, this effort was recently given further impetus when two studies (Neuman *et al*., 1994; Callahan *et al*., 1994) and an editorial (Collins, 1994) suggested that the financial cost and, possibly, also the required human effort to establish a pregnancy and achieve a live birth, may be excessive.

In a cooperative effort between the largest provider organization for infertility services in Illinois and the state's largest insurance provider, we have embarked on a series of studies which attempted to define provider models for infertility care which are both of high quality and cost-effective. In a prior study we already reported that many infertility couples demonstrate a surprisingly small commitment to their clinical care, and frequently drop-out from treatment within a very short time period after initiation (Gleicher *et al*., 1996). Such large drop-out rates obviously produce a waste of sparse medical resources. We were, however, especially intrigued by the fact that patient drop-out rates varied greatly between couples receiving insurance coverage through a provider-restricted health maintenance organization (HMO) and those receiving care through a basically unrestricted preferred provider organization (PPO). This observation then led to a more comprehensive comparison of infertility care provided under both HMO and PPO insurance conditions, which is presented in this communication.

Materials and methods

The Center for Human Reproduction (CHR) is Chicago's largest infertility provider, seeing currently >3800 new infertility couples annually. It also serves as the exclusive provider for infertility services to Chicagoland's largest managed care provider, HMO–Illinois, which is owned and operated by Blue Cross/Blue Shield of Illinois (BC/BS-I) (Pratt *et al*., 1995). The membership of HMO-Illinois is fully insured for all infertility coverage, inclusive of up to four cycles of assisted reproductive technologies. This extensive insurance coverage grew out of an insurance mandate for infertility coverage, called The Family Building Act, signed into law as of January 1, 1992 (HR-1470, 1992) which allows for only very limited exceptions to full infertility coverage, with up to four assisted reproductive technology cycles for a first child.

HMO–Illinois patients experiencing an infertility problem, therefore, have no insurance-covered alternative option for care than seeing a physician at the CHR. This quite strongly suggests that patients who abandon treatment do not simply transfer their care to other infertility providers since their care at those providers would represent an uncovered benefit. It is also important to note that infertility services under HMO–Illinois insurance plans are contracted separately from the overall capitation (capitations are monthly payments made by insurance carriers to provider organizations independent of subsequent utilization of resources; in other words, a capitation arrangement

places cost risks on the provider) paid to participating medical groups or Independent Physician Associations (IPAs) for all other medical services. Primary care providers have, therefore, a strong incentive to refer patients with infertility problems as soon as possible to specialists at the CHR. They, as well as general gynaecologists, have in fact a strong disincentive to provide infertility services, since they would not be reimbursed by HMO–Illinois for any of these services. HMO–Illinois patients thus represent a captive infertility population which, with overwhelming likelihood receives basically all fertility services (female as well as male) through the CHR. They, in this study, represent group II.

In contrast, BC/BS-I PPO patients (group I) had an almost unlimited choice of fertility providers. The CHR was, in fact, only a relatively small volume provider during the study period. Out of 96 investigated PPO patients, only two received care through the CHR during the study period. Moreover, infertility care for PPO patients was provided by both obstetrics/gynaecology generalists as well as subspecialists in reproductive endocrinology/infertility. In contrast, HMO care to group I patients was exclusively provided by specialists.

In 1994, BC/BS-I retrieved at random 98 patient couples from their PPO database who, during 1992 and 1993, were assumed to have entered infertility treatment. This assumption was reached based on the performance of a hysterosalpingogram (HSG), a diagnostic study usually performed early in a couple's infertility work-up. The female also had to be of reproductive age to be selected for the study. Within the PPO population, insurance coverage for infertility services was not homogeneous despite the Family Building Act (HR-1470, 1992). BC/BS-I was, therefore, not willing to rely on proper diagnostic coding for 'infertility' to select patients out of their data bank and felt that a selection based on the performance of an HSG would reflect a more unbiased infertility population without intentional diagnostic miscoding (Cain, 1993).

After patients were selected based on an HSG, their subsequent billing records were investigated by a medical statistician familiar with fertility codes to confirm that fertility services had, in fact, been provided. Based on billing records, 96 out of 98 couples were confirmed to have received fertility treatment. They constituted the initial PPO study group (group I).

These patients were then matched by date of HSG (within 1 month) and female age with an HMO patient couple that received infertility treatment at the CHR. With the date of HSG being considered day 0, both groups of 96 couples were then followed for drop-out from treatment (as previously reported by Gleicher *et al*., 1996) and outcome, defined as the occurrence of a clinical pregnancy (gestational sac on ultrasound) or failure to conceive. They were also investigated in regard to what it took to achieve pregnancy (for example, the performance of surgical procedures), and for cost factors for individual treatment components, cost per pregnancy and total group costs.

Costs for PPO patients were defined as the actual costs to the insurer, which during the study period reflected ~80% of charges (B.VanderLaan, unpublished data). Amongst HMO patients, costs were defined as 90% of charges, based on historical CHR experience (N.Gleicher, unpublished data). Costs also included an average facility cost of $4682 per surgery for PPO and of $1800 for HMO patients. These average surgical facility costs were based on historical BC/BS data charges (B.VanderLaan, unpublished data) and are reflective of the fact that PPO patients underwent disproportionally more in-patient surgeries, while HMO patients experienced relatively more ambulatory surgical procedures.

Physician charges for the PPO population were extracted from the computerized database of BC/BS-I, while HMO charges were retrieved from the computerized database of CHR. All data extraction from both data banks was performed by a medical statistician (K.N., see acknowledgement) who also verified eligibility of PPO patients for study induction after they had been computer-selected by HSG.

Statistical analysis was performed using a standard computerized statistical package, including χ^2-analysis with Bonferroni correction and analysis of variance, where applicable.

Results

Table I summarizes patient and general treatment characteristics for both study groups. The PPO population (group I) was further subdivided into groups IA (services provided by infertility specialists) and IB (services provided by general obstetricians/gynaecologists). Mean ages of all patient groups were similar. Treatment lengths, as defined by the number of days under active treatment, between groups I and II were also similar, though the average treatment length in subgroup IB was significantly shorter (131 $\pm$ 142 days) than for either group IA (248 $\pm$ 197 days; $P = 0.003$) or group II (211 $\pm$ 180 days; $P < 0.021$). This difference in treatment length could be directly attributed to the exceedingly high non-pregnant patient drop-out rate in subgroup 1B (82%) versus group II (20%) at 120 days from HSG, which has previously been reported (Gleicher *et al*., 1996) [$P = 0.0019$; odds ratio 2.87; confidence interval (CI; 1.39–6.06)].

The clinical pregnancy rate in group II was higher (43%) than in group I and all subgroups (all 29%); however, this difference reached only marginal statistical significance ($P = 0.05$; odds ratio 0.55; CI 0.29–1.05). There was also no significant difference between groups in the length of treatment until pregnancy was achieved.

Significant differences, however, were noted in the frequency of surgical utilization. Group I patients underwent significantly more surgical procedures (mean 0.05 $\pm$ 0.08) than group II patients (0.3 $\pm$ 0.5; $P = 0.0016$; odds ratio 2.65; CI 1.38–5.13). This difference was exclusively attributable to subgroup IA patients who underwent surgery at a highly increased rate in comparison to group IB ($P < 3\times10^{-7}$; odds ratio 14.35; CI 4.87– 43.49) and group II ($P < 3\times10^{-7}$; odds ratio 10.5; CI 4.24– 27.04).

Table II summarizes cost issues without any consideration of patient drop-out rates. As can be seen, total costs to BC/BS-I were ~20% higher in group I ($747 762) than group II ($623 000). Consequently, the cost difference per treated couple of $1299 was also in favour of group II ($6490) versus group I ($7789). However, within group I, there were even more dramatic cost differences. On a per couple basis, they translated into an average cost of $14 537 in subgroup IA and only $1836 in subgroup IB. Even more obvious cost differences were noted when costs were calculated per clinical pregnancy achieved. Since group I patients experienced fewer pregnancies than group II, their per pregnancy cost of $26 706 was considerably higher than the $15 195 of group II. The most dramatic differences, however, were once again noted within group I. Subgroup IA patients experienced a per pregnancy cost of $50 319, while subgroup IB patients demonstrated a cost of only $6241 per pregnancy achieved.

Figure 1 summarizes patient drop-out rates in all subgroups at 60 and 120 days from HSG and at an arbitrarily chosen

Table I. Patient and treatment characteristics

		Group I[a]					
	Total (n = 96)	IA[b] (n = 45)	IB[b] (n = 51)	Group II[a] (n = 96)	P value	Odds ratio	Confidence interval
Age (years)	33 ± 48	33.9 ± 4.8	32.7 ± 4.7	33.1 ± 4.5	ns		
Days of treatment	185 ± 179	248 ± 197†	131 ± 142*†	211 ± 180*	0.021*; 0.003†		
Total no. of non-pregnant patients	61	33	28				
% of non-pregnant patients who dropped out	57 (35*/61)	36 (12/33)	82 (23/28)	20(16*/80)	0.0019*	2.87	(1.39–6.06)
No. of pregnancies (%)	28 (29)	13 (29)	15 (29)	41 (43)	0.05	0.55	(0.29– 1.05)
Days to pregnancy	204 ± 152	273 ± 167	144 ± 110	174 ± 160	ns		
No. of surgeries (mean ± SD)	450.5 ± 0.8*	350.8 ± 1.0†‡	100.2 ± 0.5†	240.3 ± 0.5*‡	0.0016*	2.65	(1.38–5.13)
					3×10^{-7}†	14.35	(4.87–43.49)
					3×10^{-7}‡	10.5	(4.24–27.04)

[a]Group I = couples insured by preferred provider organization (PPO); group II = couples insured by health maintenance organization.
[b]PPO group subdivided into IA (services provided by infertility specialists) and IB (services provided by general obstetricians/gynaecologists).

Table II. Cost structure (in $) without consideration of patient drop-out rates

		Group I[a]			
	Total	IA[a]	IB[a]	Group II[a]	P value
Physician charges per couple (mean[b])					
Office visits	3804	7833	250*	2503*	0.003*
Laboratory tests	1278*	2597	113†	2956*†	0.01*; 0.003†
X-ray and procedures	290*	302*	279*	900*	0.001*
Surgery	1621*	2886*†	505†	352*	0.001*; 0.003†
Total	6993	13 619	1147*	6711*	0.003*
Per pregnancy	23 976	47 142*	3899†	15 713*†	0.01*; 0.001†
Physician cost per couple[c]					
Total	5594	10 895	918*	6040*	0.001*
Per pregnancy	19 181	37 714	3119	14 142	n/a
Facility cost[d]	2194	3642	918	450	n/a
Per pregnancy	7525	12 605	3121	1054	n/a
Total costs ($)					
All couples	747 762	654 149	93 613	623 000	n/a
Per couple	7789	14 537	1836	6490	n/a
Per pregnancy	26 706	50 319	6241	15 195	n/a

[a]See Table I. n/a = not applicable.
[b]Standard deviations not listed but available upon request.
[c]Defined as –20% of charges for PPO and –10% for HMO.
[d]Defined as an average PPO cost of $4682 per surgery and of $1800 per HMO surgery.

time cut-off, characterized by generated physician charges of $2000. As can be seen, and has been reported previously in more detail (Gleicher *et al*., 1996) patient drop-outs of non-pregnant couples were throughout significantly lower in group II than group I patients. This finding was of major importance if actual costs were to be calculated, since a calculated distribution of costs over patients who actually have dropped out from treatment distorts the real picture. Programme costs had, consequently, to be normalized for voluntary patient drop-out from treatment.

Table III presents such cost considerations, accounting for patient drop-outs from care. These calculations were based on (discounted) physician charges and facility costs. As the table demonstrates, per couple physician costs increased if patient drop-out was considered, whereas per pregnancy cost obviously decreased. The true cost per couple in group I was therefore $11 367, and each clinical pregnancy established in this PPO population carried a cost to the insurance carrier of $24 763. In contrast, in group II the true cost per couple was $7343 and the cost per pregnancy was $14 328, or 42% lower.

The large cost differences within group I, between infertility providers and general obstetricians/gynaecologists, was also maintained under calculations taking into account patient drop-out rates. In fact, with per couple costs of $18 646 and per pregnancy costs of $47 331, infertility specialists providing services within the PPO were 154% more costly per couple treated and 230% more expensive per established pregnancy than infertility specialists within the HMO. In contrast, care provided by generalists within group I (subgroup IB) resulted in dramatically lower costs, with per couple cost being $2787 and per pregnancy cost $5203, which represent a 62 and 63% saving over HMO care respectively.

Table III. Physician and facility cost structure (in $) taking into account patient drop-out rates (at 120 days)[a]

		Group I			
	Total (n = 61)	IA (n = 33)	IB (n = 28)	Group II (n = 80)	P value
Total physician charges					
Per couple (mean[b])	9891	17 100	1394*	7559	0.001*
Per pregnancy	21 548	43 408	2602	14 749	n/a
Physician cost[c]					
Per couple	7913	113 680	1115*	6803*	0.001*
Per pregnancy	17 238	34 726	2082	13 274	n/a
% change from Table II					
Per couple	+42	+26	+22	+13	n/a
Per pregnancy	–11	–8	–23	–6	n/a
Extrapolated actual cost[d]					
Per couple total	11 367	18 646	2787	7343	n/a
Per pregnancy	24 763	47 331	5203	14 328	n/a

[a]Excludes all non-pregnant patients with <120 days treatment.
[b]Standard deviation not listed but available upon request.
[c]Defined as –20% of charges for PPO and –10% for HMO.
[d]Represents physician cost and facility cost.

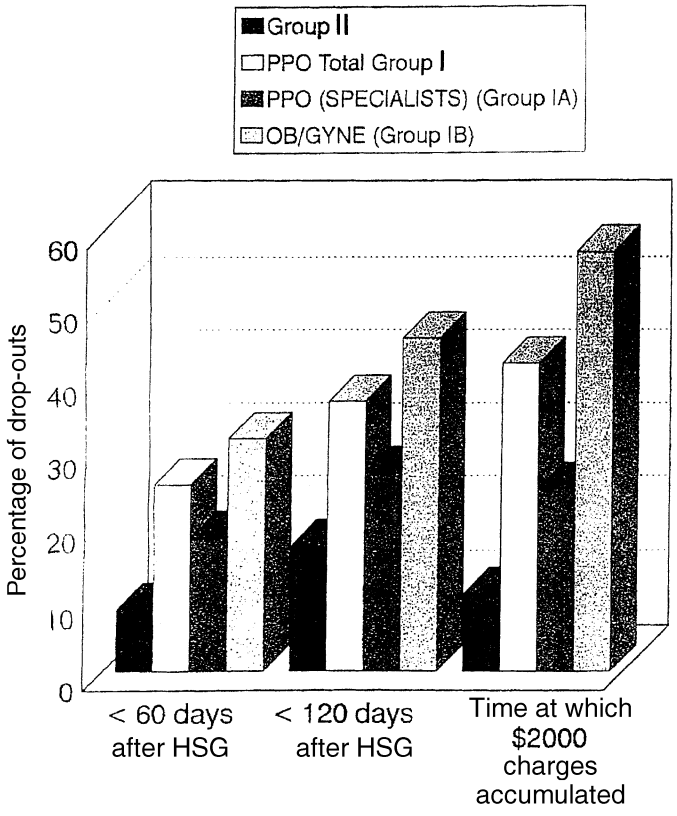

Figure 1. Patient drop-out rates from care. At 60 and 120 days from hysterosalpingogram (HSG) and at an arbitrarily chosen time of treatment (when $2000 in physician charges had been generated), group II patients (insured by HMO) uniformly demonstrated significantly lower drop-out rates ($P < 0.002$) than group I patients. These data are presented in more detail elsewhere (Gleicher *et al.*, 1996). HMO = health maintenance organization; PPO = preferred provider organization; OB/GYNE = obstetricians and gynaecologists.

Discussion

This study attempted to assess whether infertility care within a provider-restricted HMO framework varied in quality and cost from care in an almost unrestricted PPO setting. It is assumed by some that patient satisfaction in restricted HMO settings is lower than under insurance situations that provide a wider variety of provider choice. Objective studies have, however, been unable to confirm this, and have, in fact, demonstrated in general high degrees of patient satisfaction in HMO settings (Lubeck *et al.*, 1985; Rossiter *et al.*, 1989). As we have previously reported (Gleicher *et al.*, 1996), this is also confirmed in the patient populations investigated here. While patient satisfaction was not directly assessed, patient drop-out rates from care can be reasonably assumed to reflect a patient's satisfaction level with care. In our matched populations, patient drop-out rates by various criteria (time as well as amount of services received) were significantly lower amongst HMO than PPO patients, strongly supporting the contention that the patient satisfaction level was not decreased because of a restriction in provider choice under HMO conditions.

Any comparison of quality of care has to consider patient outcomes. In infertility therapy, the occurrence of pregnancy represents a readily assessed and significant outcome parameter. Based on this outcome criterion, HMO care was by no means inferior. In fact, a strong argument can be made that HMO care was superior to PPO care since HMO couples not only demonstrated marginally higher pregnancy rates, but achieved those with significantly fewer surgical interventions, and at a lower cost per pregnancy. The utilization of less surgery in the presence of comparable (or better) results has to be considered a major positive quality of care issue since a decrease in unneeded surgical interventions has to be seen as one of the most basic goals of health care reform (Fries *et al.*, 1993).

Since our study format did not permit a patient match by underlying cause of infertility, we cannot preclude the possibility that the retroactive match used here selectively biased against the PPO patient group (group I). Such a bias, resulting in comparatively more severely affected patients in the PPO group, could then account for lower pregnancy rates, more surgery and higher cost. Such an explanation is, however,

extremely unlikely. In fact, a bias to the disadvantage of the HMO group (group II) is far more likely, considering the format of this study. This is due to the fact that the CHR, as the only provider organization for the HMO population, had to accept all patients into treatment. Moreover, these patients had no incentive to decline care since they were at no financial risk. In contrast, in the PPO group, various co-payments and/or deductibles place patients at significant financial risk. Since more severely affected patients require more service, such patients can be expected to carry more financial risk and to be more likely to be counted among treatment drop-outs.

Against a bias in favour of the HMO group also speaks the fact that a large portion of PPO patients received care from generalists. It is quite likely that within group I a selection bias existed that directed the milder cases of infertility towards the generalist, while infertility specialists provided care to the more severely affected patients. In this study, only 51 out of 96 PPO patients were placed into subgroup IB (generalists). In fact, the number of patients treated at least initially by generalists was even larger, since every couple that switched care from a generalist to a specialist during the study period was by study design placed into subgroup IA (subspecialist care). Considering the fact that so many group I couples received care from generalists, and also considering the fact that this care was quite successful in terms of pregnancy rates, it seems extremely unlikely that group I represented a disproportionally severe patient population in comparison to group II.

Despite the potential selection bias within group I, the extremely high surgical utilization (35 procedures in 45 patients; 78%) appears remarkable and cannot simply be explained by selection bias (Table I). The surgical utilization in the total HMO subpopulation (group II) did, in fact, not differ from that in the obviously low severity subgroup IB (generalists) but was significantly lower than in total group I ($P = 0.0016$; odds ratio 2.65; CI 1.38–5.13) and subgroup IA (specialists) ($P < 3\times10^{-7}$; odds ratio 10.50; CI 4.24–27.04). One therefore has to conclude that in a PPO setting, surgical utilization appears higher and seems driven by the care provided by subspecialists.

Lastly, costs need to be considered. Cost data with regard to infertility care are always suspect since restricted insurance coverage unfortunately leads to frequent miscoding of diagnosis and treatment (Cain, 1993). The insurance industry has, therefore, only very limited cost data available and has to rely on studies which usually address only selected treatment options (Neuman *et al*., 1994; Callahan *et al*., 1994). Such an approach creates the potential of considerable bias because no treatment option is applied in a vacuum. For example, in-vitro fertilization (IVF) is currently considered a treatment of last resort (Jones and Toner, 1993). To evaluate selectively only the costs of IVF (Neuman *et al*., 1994), and not to consider that under current treatment regimens only ~5–15% of infertility couples will reach this treatment option, does not allow for a representative reflection of true infertility treatment costs on a per pregnancy basis.

The HMO population reported here (group II) is unique because it represents a large captive patient base which has to receive all infertility care from one provider organization. The cost data for these HMO patients are, therefore, almost beyond reproach, since this patient population has no other treatment choices and, therefore, does not allow the introduction of selection biases except for local Illinois medical cost considerations and the obvious bias that every medical provider's (organization's) practice may slightly differ in their respective style of practice.

The PPO population reported here (group I), in contrast, reflects all of the obvious potential biases of an average patient population, which has basically complete choice of provider but may have limited insurance coverage for certain aspects of care. Whatever those biases may be, this study provides as accurate a cost assessment of infertility care as an insurance company can obtain. What this study did not consider were potentially hidden costs, such as co-payments made by patients themselves. Such co-payments can be considerable and the PPO treatment costs reported here have, therefore, to be seen as conservative. Because PPO insurance plans offer a great variety of coverage for injectable medication, this rather significant cost in fertility care was also not considered in this study. Under HMO conditions, during the study period, injectable medication costs at wholesale pricing represented ~15% of total physician charges (N.Gleicher, unpublished data). True medication costs in the PPO population could, however, not be assessed accurately, thus this cost component was not considered in the study.

In assessing overall cost otherwise, however, it was remarkable that the cost of PPO care still greatly exceeded the cost of HMO care. This finding is in contrast to expectations, since one would assume that the cost to insurance carriers for PPO care would be lower, in view of the considerably more restricted insurance benefits offered by PPOs. Restricted infertility coverage is frequently bypassed by providers through the intentional miscoding of diagnoses and/or treatments (Cain, 1993). To overcome such an obvious selection bias, PPO patients in this study were not chosen based on a diagnosis of infertility but based on a standard diagnostic test, usually performed early in every couple's infertility evaluation.

This study design, while by no means perfect, nevertheless allows for the first time a reasonable analysis of fertility treatment costs in a relatively open market (PPO, group I). No other study has, to our knowledge, previously attempted to do this.

The most interesting cost finding in this study may be the cost distribution within the PPO between subspecialists and generalists (groups IA and IB, respectively) and how these costs individually compare to HMO cost. Infertility specialists within the PPO generated dramatically higher costs than specialists within the HMO ($46 331 versus $14 328, per pregnancy respectively, after patient drop-outs). This cost differential is not simply explainable by the fact that, within the PPO, specialists obviously treated the more severely affected patients. In contrast, the lowest treatment costs were encountered in patients receiving care from generalists (per pregnancy cost $5203) which, most likely, reflects the treatment of relatively mild cases by this group of physicians. However, since, overall, PPO patients encountered 41% higher per

pregnancy costs ($24 763 versus $14 328 in the HMO), one has to conclude that subspecialists within the PPO generate greatly higher costs than specialists in an HMO setting.

As is reflected in Table II, these excessive costs almost exclusively arise from disproportionate office visit costs and, especially, from surgical costs, which are significantly higher in subgroup IA than group II. This, in turn, results in a significant overall cost difference in surgical costs between PPO and HMO, despite very low surgical utilization in subgroup IB.

In conclusion, these data on first reflection suggest that the most cost-effective insurance strategy to provide fertility services should include a combination of services provided by general obstetricians/gynaecologists and subspecialists, with the latter practising within a closely monitored managed care setting. Under this kind of a programme, couples with apparently mild infertility problems would initially undergo minimal evaluation and treatment by generalists and be referred to a specialist if pregnancy has not occurred within a preset time period. This kind of arrangement would allow subspecialist providers to function at maximum efficiency, since larger patient volumes allow for a more cost-effective provision of services.

However, such an approach also carries considerable potential dangers to both cost containment and patient satisfaction. We previously reported that in the same PPO patient population, which is reported here, patients who did not conceive under the care of generalists demonstrated by far the highest patient drop-out rates (82%) amongst all study groups (Gleicher *et al*., 1996). This observation suggests a considerable level of patient dissatisfaction in those couples who do not conceive extremely rapidly, because drop-out rates were calculated within 120 days from HSG.

These data in addition raise yet another important cost issue; namely, what effect does patient drop-out have on cost? The present study cannot answer this question, nor are there data in the literature to allow an answer. On first impulse, one would conclude that a patient's drop-out from infertility care saves cost for the insurance carrier. On further examination this may, however, not be the case since many infertile couples will re-enter treatment at a later date, requiring costly repeats of diagnostic and therapeutic procedures, while facing decreasing success odds due to advancing age (Healey *et al*., 1994). In the final analysis, the quick achievement of pregnancy may, therefore, be one of the most important factors in controlling costs during infertility therapy.

As Table I demonstrates, none of the investigated groups and subgroups demonstrated a time advantage in achieving pregnancy. In fact, surprisingly, even though one might have expected subgroup IB couples to achieve pregnancy the quickest, they basically demonstrated identical time schedules to HMO patients (group II). A trend towards a slower achievement of pregnancy was only seen in subgroup IA.

Considering, therefore, the enormous drop-out rate in non-pregnant couples under treatment by general obstetricians/gynaecologists (82%), one has to wonder whether generalists really represent a cost-effective first treatment choice for couples with infertility. Further doubt comes from the need for perfect integration of services between generalists and specialists if costly repeat tests and treatments are to be avoided after a transfer of care from one provider to the other. Such ideal integration of services only rarely exists, if ever.

We therefore conclude that our data may, in fact, suggest that the most cost-effective provision of infertility care will occur within a well-managed care setting, involving subspecialists throughout. Alternatively, a closely integrated system between generalists and specialists in a managed care setting could be chosen. However, such a programme option would have to include additional efforts to reduce patient drop-out rates in couples under early infertility care by generalists.

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