7

Costs

Task 5: *Assess current policies and the potential impact of the Final Rule on costs of organ transplantation services.*

Abstract. **Based on data provided to the committee by the GAO, as well as the published literature, the committee finds that total expenditures associated with organ procurement and transplantation are likely to increase as a result of broader sharing. OPOs and transplant teams may both experience higher transportation costs. In addition, a larger number of sicker patients will receive transplants and there will likely be more retransplants— both of which would increase costs. The committee was unable to estimate the magnitude of the increase, but believes it would be marginal compared to the total expenditures for transplantation. The committee also believes the health benefits of implementing broader sharing will be substantial and outweigh any net increase in expenditures.**

Some of those who have commented on the implications of the Final Rule believe it will increase the total expenditures associated with transplantation because of the combined effects of sharing donated organs over a greater geographic area and using donated organs in patients who are more severely ill. Sharing donated organs over a greater area will increase expenditures, they argue, because it will cost more to transport organs greater distances. In addition, the increased travel time will decrease the viability of the organs, decrease the graft survival rate, and increase the number of retransplants. Transplantation in more seriously ill patients will increase costs and expenditures, it is claimed, because it is more expensive to transplant sicker patients. Moreover, transplanting sicker patients will result in a higher rate of graft failure and an increase in retransplantations. The committee, with the assistance of the General Accounting Office (GAO), gathered and analyzed data for each of these points.

DEFINING THE COMPONENTS OF COST

Previous analyses of the financial aspects of transplantation by Evans (1993 and 1995b; Evans and Kitzmann, 1997) have underscored the importance of distinguishing among accounting costs, billed charges, estimated reimbursement, and contracted prices. Definitions for each of these concepts are provided in Table 7-1.

TABLE 7-1 Economic Concepts in Health Care

Concept	Definition
Cost	The economic value of both the labor and resource inputs required to provide a service or perform a procedure, excluding markup (i.e., production cost).
Charge	The amount a patient or third-party payer is actually billed by a health care organization (i.e., list price).
Reimbursement	The amount a patient or third-party payer actually pays based on billed charges, determined retrospectively or prospectively. There is often a shortfall between billed charges and payment.
Price	The amount a third-party payer, usually a managed care plan, has determined in advance (i.e., prospectively) it will pay for a service or procedure (i.e., capitated) payment.

SOURCE: Reprinted by permission of Evans, 1995b. All rights reserved.

More often than not, economic analyses of transplantation have been based on billed charges. Actual reimbursements are typically less than billed charges, particularly in a managed care environment, where contracted prices have become the norm. Nonetheless, data on accounting costs and contracted prices are rarely available and, therefore, charges have been the basis for most economic studies. The analysis in this chapter is based on billed charges.

The overall charges associated with solid organ transplantation are substantial. Table 7-2 shows the total billed charges for 1996 for each category of organ transplants, as well as the average billed charge per transplant procedure and the average total charges billed by each transplant program.

The major components of these billed charges include hospitalization of the patient before, during, and after the transplant; evaluation of the patient's condition and suitability for a transplant; acquisition of the donated organ and evaluation of its suitability; transportation of the organ from the site of donation to the site of transplantation; use of the operating room; fees of the various physicians; and posttransplant therapy, including immunosuppressive medications (Evans, 1985; 1986).

The charges associated with each component can vary, sometimes substantially, depending on the condition of the patient, the condition of the donor, the location and standard practices of the donor site and transplant program, and other factors. Summary estimates of the average charges billed for major categories of expense are shown in Table 7-3. As noted previously, the actual cost incurred by health care providers, as well as the amount reimbursed by third-party payers, is typically lower than the billed charges, sometimes by a significant amount.

TABLE 7-2 Estimated Billed Charges ($1,000s) for Transplants, 1996

Major Organ	No. of Programs	No. of Transplants	Total Program-Billed Charges	Average Billed Charges per Transplant	Average Program-Billed Charges
Kidney	253	11,099	$1,043,306	$94	$4,124
Liver	120	4,058	1,176,820	290	9,807
Pancreas	120	1,022	112,420	110	937
Heart	166	2,342	533,976	228	3,217
Lung	94	805	194,005	241	2,064
Total programs	753	19,366	3,060,527	—	—
Total hospitals	281	19,366	3,060,527	—	10,892

SOURCE: Table reprinted from DHHS, 1998b, page 16322.

TABLE 7-3 Average Billed Charges (1996 Dollars) per Transplantation, First Year After Transplantation, 1996

	Heart	Lung	Heart–Lung	Kidney	Pancreas	Kidney–Pancreas	Liver
Evaluation	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
Candidacy (per month)	10,600	10,600	10,600	0	0	0	10,600
Procurement	25,200	24,800	24,800	22,400	16,200	26,000	24,700
Hospital	155,800	160,400	160,400	50,600	76,200	67,300	188,900
Physician	21,800	26,300	31,800	8,900	12,600	12,600	42,600
Follow-up	18,500	22,500	22,500	11,900	4,700	11,900	26,400
Immunosuppressants	10,300	10,300	10,300	11,300	5,100	12,500	10,300
Total	253,200	265,900	271,800	116,100	125,800	141,300	314,500

NOTE: "Charges" refers to the amount billed by the provider and may not be the actual expense incurred by the provider in performing the services.

The committee assumed, based on the discussion in Chapter 5, that the Final Rule would result in the transplantation of more status 1 and, possibly, more status 2A patients and fewer status 2B and status 3 patients. It also assumed there would be more retransplantations, and increased organ acquisition costs due to greater distances, on average, between the site of donation and the site of transplantation. Although there may be some offsetting decreases in expenditures, the committee concluded that these assumptions will result in a net increase in the overall expenditures associated with transplantation.

TABLE 7-4 Information on Medicare-Covered Liver Transplant Recipients, Calendar Year 1995 through 1998

	Status 1	Status 2	Status 3
Number of Patients	199	555	737
Length of Stay, Days			
Mean	39	32	19
Range	1–185	1–727	1–266
Days from Hospital Admission to Transplant			
Mean	16	12	1
Range	0–142	0–440	0–72
Days from Transplant to Discharge			
Mean	23	20	17
Range	0–178	0–287	0–246
Total Charges (U.S. dollars)			
Mean	300,692	185,135	140,518
Range	57,370–2,569,086	35,267–2,683,110	30,027–1,454,216

NOTE: The UNOS severity of illness status codes changed during the period of this analysis; therefore, the committee created uniform status codes. Status 1 patients are the most severely ill and have < 7 days to live without a transplant. Status 2 patients are cared for in the hospital either in acute or intensive care. Status 3 patients are under continuous medical care and are generally at home with some hospital stays.

SOURCE: R. Hogberg, GAO, personal communication, June 29, 1999.

INCREASED EXPENDITURES DUE TO TRANSPLANTATION OF SICKER PATIENTS

The GAO provided IOM with data on Medicare expenditures for liver and heart transplantation (R. Hogberg, GAO, personal communication, June 29, 1999). For liver transplants, the GAO data showed that status 1 patients who received a transplant had longer hospital stays, both before and after transplantation, and

higher total charges than did status 2 patients (see Table 7-4). Similarly, status 2 patients had longer hospital stays and higher total charges than status 3 patients. The GAO data showed similar results for status 1 and status 2 heart transplant patients. If, as the committee assumes, implementation of the Final Rule results in more status 1 (and status 2A), but fewer status 3 patients receiving transplants, there would likely be an increase in total Medicare expenditures, even if there was no change in the total number of transplants performed.

Because the GAO data were based on Medicare data, one question for the committee was whether this conclusion was valid for all other transplant patients. To answer this, the GAO examined whether Medicare patients undergoing liver and heart transplantation were reasonably representative of all patients undergoing these procedures. The results indicate that Medicare patients were comparable with respect to gender, race, and ethnicity, but were significantly older, than non-Medicare patients. This finding is consistent with studies reported by Evans (1993; 1994; 1995a; and Evans and Kitzmann, 1997), Whiting et al. (1998; 1999), and by Showstack et al. (1999). These studies concluded that status 2 patients were significantly more expensive to transplant than status 3 patients, with length of hospitalization being a major factor. Therefore, although the committee did not assume that the amount of the expenditures for non-Medicare patients would be exactly the same as those for Medicare patients, it did accept the pattern of cost differentials among different status patients described in the GAO analysis as comparable to what would be seen in the general population.

Thus, the committee concluded that implementation of the Final Rule would result in a net increase in total expenditures due to the transplantation of more severely ill patients. However, the committee was not able to estimate how large that increase would be, for several reasons. First, it is not clear exactly how the Final Rule will be implemented and, therefore, it is not clear how many patients would be affected in each status.

Second, it is not clear how large the net charge differential would be, on average, for transplanting a status 1 or status 2A patient rather than a status 2B or 3 patient. In the data provided to the committee by the GAO, for example, a substantial part of the higher charges for status 1 and 2 patients was due to a longer length of stay prior to transplantation. (Status 1 and 2A patients on the waiting list are typically in an intensive care unit, many status 2B patients are in acute care settings but many are not, and status 3 patients are normally being cared for in a non-hospital setting.) If more status 1 and 2A patients were transplanted, presumably there would be a decrease in the number of hospital days used by these patients awaiting a transplant. The resulting savings would partially offset the increased expenditures associated with transplanting these patients. Similarly, the pretransplant hospital stay apparently contributed, in part, to the increased expenditures for status 2 patients in the Whiting study (1999) (but not in the Showstack [1999] study). This adjustment to savings would, in turn, be further offset by an increase in the treatment-related expenditures for status 3 patients awaiting transplantation.

Liver retransplantation is a more expensive procedure than first-time transplantation, according to the studies by Evans (1993; 1994; 1995a; and Evans and Kitzmann, 1997), Whiting (1999), and Markmann et al. (1997). The committee concluded that implementation of the Final Rule (or establishing organ allocation areas that serve a population of at least 9 million people, as recommended in Chapter 5 of this report) by increasing the number of severely ill patients receiving transplants, would increase total expenditures to some degree because of an increase in the number of retransplants. It was unable, however, to estimate either the average differential in cost or the increase in number of retransplants.

INCREASED EXPENSES FOR ORGAN ACQUISITION

For the purpose of providing the committee with information about organ acquisition practices and expenses, the GAO collected data from a sample of six OPOs and some of their associated transplant centers. The results suggest that the acquisition practices and, therefore, acquisition expenses vary considerably among transplant centers and OPOs (Evans et al., 1993). OPOs are reimbursed by transplant centers for their role in acquiring, preserving, and transporting a donated organ. Reimbursement is typically a prospectively set fee, reflecting each OPO's standard acquisition costs. The committee assumes for the reasons set forth below, that the actual cost to the OPO for the procurement of organs will increase under broader sharing and, in turn, these added costs will be passed on to transplant centers in the form of higher fees. These higher fees represent an increase in cost to the transplant centers.

The process of matching an available organ with a prospective transplant recipient begins before the organ is removed from the donor. Once the organ has been accepted by a transplant center, a decision must be made regarding who will remove the organ from the donor. Sometimes a surgical team from the transplant hospital travels to the site of the organ donor to excise the organ; at other times, the transplant center relies on a local surgical team to do so. In its survey of OPOs for this committee, the GAO found that a surgical team from the transplant center almost always travels to retrieve hearts and lungs, but seldom does so for kidneys. The practice with respect to livers seems to vary considerably, depending on whether experienced transplant surgeons are available at the donor site.

The transportation expenses associated with sending a surgical team from the transplant center to retrieve an organ can be substantial, depending on the size of the surgical team and the distance and mode of travel. Because of the need to proceed expeditiously with organ retrieval and transplantation, the preferred mode of travel is often air, frequently by chartered aircraft.

Similarly, the expense of transporting an organ will vary considerably depending on the distance and mode of travel. The GAO found that the costs of transporting organs varied from a few hundred dollars for ground travel to several thousand dollars for air travel. The committee assumed that the expense of

organ acquisition would be increased under broader sharing because of the sharing of organs over a greater geographical area. However, the committee was unable to estimate the magnitude of this change, given uncertainties about how the Final Rule will be implemented, how much larger the new geographical areas will be and how they will affect travel times, and how the organ acquisition practices of transplant centers might change over time. The potential increase might appear significant in absolute dollars. However, as shown in Table 7-3, expenditures for procurement are a relatively minor component of overall expenditures for transplantation. Therefore, such an increase would likely have a marginal impact on total cost.

The committee confined its analysis to the expenses and expenditures directly associated with organ acquisition and transplantation. It did not attempt to evaluate other aspects that might appropriately be taken into consideration, such as the value of additional lives saved for status 1 and status 2A patients who receive a transplant or the cost of additional years of impaired health incurred by status 3 patients who do not receive a transplant.

CONCLUSION

Expenditures for organ procurement and transplantation are likely to increase as a result of broader sharing. The committee is not, however, able to estimate with confidence how large the increase might be because it is not clear how the Final Rule will be implemented and how many patients in each status will be affected. In addition to transportation expenses, implementation will alter multiple factors affecting transplant expenditures. These factors can vary widely from one case to another. Any increase in expenditures must, however, be weighed against the additional health benefits gained through broader sharing, which the committee believes will be substantial and could outweigh any net increase in expenditures.