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BACKGROUND PAPER ON CATARACT SURGERY AND
PHYSICIAN PAYMENT UNDER THE MEDICARE PROGRAM

Louis P. Garrison, Jr., Ph.D.
Sandra M. Yamashiro, M.P.A.

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SECTION 1

INTRODUCTION AND SUMMARY

PURPOSE OF THE PAPER

General pressures to contain the costs of the Medicare program have led Congress and the Health Care Financing Administration (HCFA) to examine alternative methods of paying for medical services in general and for physician services in particular. Because physicians directly or indirectly control the large majority of medical expenditures, and because medical expenditures are so closely tied to the use of medical technologies, Congress requested the Office of Technology Assessment (OTA) to examine alternative methods of paying physicians under the Medicare program, with particular attention to the impact on the use and costs of technology. As part of their study, OTA is examining the impact of alternative payment methods on a variety of specific medical technologies. This background paper is intended to provide OTA a case study of how alternative methods of paying physicians might affect the efficiency, equity, quality of care, and related aspects of the provision of cataract surgery.

CLINICAL AND ECONOMIC BACKGROUND

This paper both describes current clinical and economic aspects of cataract surgery and analyzes how alternative methods of paying physicians might affect cataract surgery in the future. The description of current clinical and economic aspects presents a picture of a procedure that has undergone several recent dramatic changes. First, the proportion of extractions followed immediately by the insertion of an intraocular lens

(IOL) has grown significantly to the point where nearly 80 percent of extractions are followed by the insertion of a prosthetic lens (Stark et al., 1984). Second, one of the technical aspects of the procedure--the placement of the lens in the eye--has also changed in the past four years. Now in almost 80 percent of cases the lens is placed in the lens capsule behind the iris, as opposed to around 40 percent of cases in 1981 (Stark et al, 1984). Third, on the economic front there has also been major change. With the advent of the Medicare Prospective Payment System (PPS) and its associated Peer Review Organizations (PROs), there has been a shift of the operation from an inpatient setting to an outpatient setting. The volume of procedures continues to grow dramatically (projected at 900,000 in 1985), and it appears that the majority of these will be performed on an outpatient basis. It is estimated that as late as 1982 only 10 percent were performed on an outpatient basis.

By way of summary, examination of the economic aspects of performing the procedure reveals several relevant findings. First, there is great variability in the amount that ophthalmologists receive for performance of the procedure. This variability, most easily discernible across geographic regions, is a feature common to many procedures reimbursed under the Medicare customary, prevailing, and reasonable (CPR) system of payment for physician services. Second, the amount paid to providers of cataract surgery supplies and services varies by setting. Hospital outpatient departments apparently receive more in many cases than either certified ambulatory surgery centers (ASC) or hospitals would receive for an inpatient procedure under PPS. Because of this, and because Medicare pays a greater share of physician charges (under assignment) in outpatient settings, there are incentives to perform the procedure on outpatient basis, when it is

medically feasible. Third, for ophthalmologists who perform cataract surgery, performance of the procedure is a relatively well-rewarded use of their time: their compensation per unit of time is higher than for their practice in general. Fourth, the dramatic growth in the rate of cataract extraction has led some to argue that unnecessary cataract surgery is now an issue. The usual difficulties of identifying and measuring unnecessary surgery are exacerbated in this case because of the very low risk of adverse outcomes and the subjective nature of benefits.

ANALYSIS OF ALTERNATIVES

Four general alternatives for paying physicians are considered in this analysis: 1) a modified CPR system, resulting in lower payments for cataract surgery for all or some ophthalmologists; 2) a fee schedule aimed at reducing the level and variability of payments to ophthalmologists for cataract surgery; 3) a packaged fee that encompasses not only the ophthalmologist's payment, but also payment for other physician services and other inputs; and 4) a capitation system, which covers cataract surgery as one item under a broad set of minimum medical benefits. Each of these alternatives is compared with the current CPR system with regard to its impact on cataract surgery. The impacts cover a number of dimensions: efficient production, efficient use, price and expenditures, access to care, quality of care/outcomes, the innovation and diffusion of technology, and financial risk-spreading.

POLICY IMPLICATIONS

After each of these alternatives is analyzed in isolation, the pros and cons of adopting one versus all or some mix of the alternatives are discussed. Each of the four alternatives would seem to have distinct advantages over the current system. In the case of a modified CPR system, these advantages may be small for cataract surgery in isolation but larger when applied to all procedures performed by ophthalmologists. The impact of a fee schedule is seen as similar to a modified CPR system in application to cataract surgery, but offering perhaps a greater potential for correcting payment distortions that have arisen within and among specialties over the years. Current developments in the economics of cataract surgery make the use of packaging, at least in the short term, an option worth examining. The little available evidence suggests that the cost to Medicare of doing cataract surgery on an outpatient basis in a hospital may currently exceed what cost would have been on an inpatient basis. However, this difference is more apparent than real because of cost shifting within the hospital outpatient setting. For example, the cost of cataract surgery as an outpatient in a certified ambulatory surgery center (ASC) is less than the typical inpatient cost. The higher payment in some cases on a hospital outpatient basis is probably a by-product of cost-reporting methods encouraged by "reasonable cost" reimbursement in that setting. In all likelihood, outpatient cataract surgery (in either an ASC or hospital) is cost-effective, relative to inpatient surgery, for the vast majority of patients.

It is argued that while capitation has a number of desirable features, its widespread application would be premature given uncertainties about possible impacts on quality of care. The term "capitation" is used to

cover a broad set of decentralized models: Medicare would pay a fixed per capita premium to an insurer or insurer/provider who would either purchase or provide cataract surgery for those covered patients who need it. The ophthalmologists performing the surgery could be compensated under a variety of schemes: fee-for-service, salaried, hourly, or some combination of these. The principal difference from the first three options is that the choice of the pricing system is left to the insurers and providers in local market areas. This is really a voucher-type scheme, as is currently available to Medicare beneficiaries who so choose. The impacts on patients under these capitation schemes are unknown and will certainly depend on what types of physician payment mechanisms are developed within these systems. The discussion in Section 4 highlights salaried arrangements, to contrast them with the other modes of payment.

In sum, the substantial variability that exists in payments across ophthalmologists or across settings is difficult to justify on cost or quality grounds. Excessive payment to ophthalmologists for cataract surgery in some areas of the country may encourage the performance of unnecessary surgery, especially where there is an abundance of ophthalmologists. Higher payments to hospital outpatient departments may encourage provision in that setting, rather than certified ASCs or private ophthalmology clinics and offices. This may not be an efficient use of resources. Development of a more rational physician fee schedule, i.e., with more of a relationship between relative costs and fees, might well promote more appropriate application of the procedure. Under a packaging scheme, by combining a more appropriate physician fee with appropriate payments to other inputs, the choice of more efficient settings and inputs could be encouraged as well. There is a justifiable reluctance to implement rapidly a wholly

decentralized, capitated approach to physician reimbursement. The encouragement of capitation options and related demonstration experiments is certainly feasible and desirable, and does not inhibit the implementation of a new centralized approach at the national level. Even a national fee-for-service approach, as is currently embodied in the CPR system, would do well to approach the packaging of services creatively. Optimal packaging under such a system should consider tradeoffs among numerous dimensions, including: provider risk, technical feasibility of identifying outputs, administrative costs, monitoring costs, and incentives for efficient production and use. Technologies evolve, and the units of payment under fee-for-service systems should change with them.

ORGANIZATION OF THE PAPER

Section 2 of this paper presents an overview of the clinical aspects of cataract extraction and IOL insertion. Section 3 summarizes the economic aspects of cataract surgery. This includes both basic data on trends in the rate of cataract extraction, and a summary of the current structure as it applies to cataract surgery. Section 4 presents an analysis of each of the four major alternatives as compared with the current CPR system. Section 5 concludes by considering the policy implications of these analyses and examines in particular the issue of which alternatives or mix of alternatives should be considered in the short run and over the longer run.

SECTION 2
CLINICAL ASPECTS OF CATARACT SURGERY

INTRODUCTION

A cataract is "any opacity or cloudiness of the lens that prevents a clear image from forming on the retina" (Terry et al., 1985). If a cataract has advanced to the point where it interferes with activities that are important to a patient, surgery is generally recommended. Surgical removal is the only method presently available for cataract elimination. Terry et al. (1985) provide an excellent summary of the clinical aspects of cataract surgery; this section relies heavily on their discussion.

There are two main methods used by ophthalmologists in the United States to remove cataracts: extracapsular cataract extraction (ECCE) and intracapsular cataract extraction (ICCE). The difference between the two has to do with the extent to which the capsule holding the lens is removed. Under ICCE, the lens and its capsule are totally removed. Under ECCE, the lens is removed from the capsule, and only the front part of the capsule is removed, leaving only the posterior portion of the capsule in the eye. Prior to the 1970's, intracapsular cataract extraction was the method most widely used in the United States. With the continuing development of new surgical technologies and techniques, extracapsular cataract surgery is becoming increasingly popular among U.S. ophthalmologists and patients.

Advances in related technologies have decreased the risk associated with cataract surgery as well as increased the likelihood of its overall success. For example, the development of extremely sharp needles, very fine sutures, and intra-operative keratometers, for measuring corneal curvature, has facilitated more effective wound closure. Surgical microscopes have

aided surgeons in ECCE, allowing them to increase the precision of their measurements through enhanced vision and improved depth perception. In addition, the introduction in the early 1980's of viscoelastic substances for use during cataract surgery has enabled ophthalmologists to protect delicate intraocular structures and to maintain the normal shape of the eye, while still allowing for the good visual capabilities needed for intraocular manipulations.

After either method of cataract removal, corrective action must be taken to restore focus and useful vision to the eye. Corrective technologies include spectacles, contact lenses, implanted intraocular lenses, and keratorefractive surgery. At present, the intraocular lens (IOL) implant is the most common method used. The IOL market appears quite competitive, with manufacturers continually marketing new IOLs and several lines of IOLs. There is no consensus on quality differentials among many types of lenses.

INDICATIONS FOR SURGERY

With advances in technology and surgical techniques, the success rate for cataract surgery has greatly increased. Complication rates associated with the surgery have dropped dramatically as a result (Terry et al., 1985). At the same time, persons age 65 and over (the population at greatest risk of developing cataracts) maintain increasingly higher daily activity levels. Many of these activities, such as driving, require good visual acuity. For example, Nadler and Schwartz (1980) demonstrated a significant growth in the proportion of licensed drivers among those over 65 during the period 1968-76, supporting the notion that the demand by the elderly for better vision is increasing. With the major surgical indicator being whether or not a

cataract is interfering with desired or essential activities, this demand for better vision as well as decreased risks associated with surgery has led to an increased demand for cataract surgery.

Preoperative care generally includes a medical examination, a complete ocular history and an eye exam. A patient's overall health must be evaluated in order to identify any medical conditions which could interfere with the decision to perform or the outcome of the cataract surgery. In addition, an ocular exam comprised of a functional exam, slit lamp exam, intraocular pressure measurement, and retinal exam, if possible, should be performed (Terry et al., 1985). Of major importance is the determination of the ability of the eye's corneal endothelium to withstand the cell loss resulting from cataract surgery. The calculation of predicted IOL power is also made preoperatively through a series of eye measurements.

HISTORY OF CATARACT SURGERY

The method of extracapsular cataract extraction (ECCE) first became popular in the 1930's. Early versions of ECCE involved removal of the cataractous lens, leaving the posterior portion of the capsule intact. At that time, cataracts were allowed to mature, thereby becoming more liquified, prior to the operation. No dependable method existed at the time for removal of the soft cortical portion of the lens. Lens material left over in the eye often left a patient with poor vision due to accompanying complications (Terry et al., 1985).

In the late 1930's, a major advance in cataract surgery was introduced--intracapsular cataract extraction (ICCE). In ICCE, both the lens and capsule are removed, leaving no fragments available to form a dense

membrane. ICCE quickly became the more prevalent method of cataract extraction.

In the late 1960's, a procedure called phacoemulsification was developed, involving the removal of the cataractous lens through a small incision made into the anterior chamber. The lens was removed by suction through this incision in the form of particles formed after fragmentation with a high frequency ultrasonically-driven vibrating probe. This procedure allowed for a more rapid recovery due to the relatively small size of the incision.

In the early 1970's, ECCE began to regain some of its former popularity as a result of the development of new surgical technologies. Irrigation and aspiration devices were developed which allowed ophthalmologists to remove, after expressing the larger bulk of the nucleus, the remaining portions of the cataractous lens through small hollow tubes called cannulas. Leftover fragments were less of a problem. The introduction in 1977 of the posterior chamber intraocular lens, which requires an intact posterior capsule, further increased the utilization of ECCE. Recently, the use of Neodymium: YAG (Yttrium-aluminum-garnet) lasers has allowed for the re-entry into the capsule without surgery for treatment of post-operative opacification.

TYPES OF CATARACT SURGERY

Extracapsular Cataract Extraction

Extracapsular cataract extraction involves the removal of the cataractous lens and the anterior portion of the lens capsule. This is achieved by making a small incision in the anterior chamber, excising and

removing the anterior capsule, expressing or phacoemulsifying the core of the cataract, and then aspirating remaining portions of the lens through a cannula. Using this method, the surgeon can leave intact the posterior portion of the lens capsule, which allows for the maintenance of the normal position of the vitreous gel in the eye. This position is necessary for the support of posterior chamber intraocular lenses.

The phacoemulsification procedure, as described above, entails the use of a high frequency ultrasonic vibrating needle to break up the hard nucleus of the cataractous lens. First, a small incision is made into the eye's anterior chamber. Then the cataract nucleus is phacoemulsified and aspirated. Because of the small size of the incision required for phacoemulsification and the decreased risk to the corneal endothelium, this technique is popular for younger patients, who generally have soft, easily emulsified nucleuses, as well as for most elderly patients. For a small percentage of elderly patients, the cataract is very firm and therefore not amenable to phacoemulsification.

In some cases the posterior capsule left in the eye after ECCE becomes opacified. To restore vision the cloudy portion must be removed. This can be done either surgically with a fine needle or nonsurgically using a laser.

Intracapsular Cataract Extraction

Intracapsular cataract extraction involves the removal of the cataract and its surrounding capsule by making an incision in the limbal area (at the junction of the cornea and sclera) and removing the cataract in a single piece. The enzyme alpha-chymotrypsin is generally used to lyse (break up) the ligaments which hold the lens in place. One advantage of

ICCE is that it leaves a completely clear pupil. ICCE is often difficult in young patients whose lens is tightly held in place. The emerging evidence appears to indicate that ICCE patients with implants have more post-operative complications, such as inflammation and retinal detachment, than ECCE patients with implants (Terry et al., 1985). In general, however, results are quite good under both ICCE and ECCE.

METHODS OF OPTICAL CORRECTION

Intraocular Lens Implant

The intraocular lens implant is the most common method in the United States for restoring focus and correcting vision after cataract surgery. An artificial lens is implanted inside the eye, allowing for good forward and peripheral vision. The distortion in visual objects is limited, approximately only 1 percent. This method is especially useful for elderly persons who do not wish or are unable to wear contact lenses.

There are three main types of lenses: 1) posterior chamber supported, 2) iris supported, and 3) anterior chamber supported. A trend toward posterior lenses and away from other types is indicated by recent manufacturer data (Stamper et al., 1984). Recent innovations include lenses that have ridges or bumps to reduce cracking from postsurgical laser treatment and lenses that absorb ultraviolet light.

Contact Lens

Contact lens, either hard or soft, can be used to correct the focus of the eye following cataract surgery. Objects are magnified only about 7

percent and peripheral vision is maintained. Many elderly patients have difficulty wearing contact lenses, however, for they lack sufficient manual dexterity to handle them. Moreover, insufficient tear production or other intolerances of the eye to contact lenses may occur. Extended wear lenses, which can be worn 24 hours a day for weeks at a time, have recently become available and may be more convenient for elderly patients. One drawback to these lenses is that they are associated with an increased incidence of corneal infections or formation of blood vessels in the cornea (Liesegang, 1984). Another potential drawback associated with these lenses is that they have been estimated to cost three times as much as intraocular lenses over a 20 year period due to replacement and periodic check-up costs (Cavanagh et al., 1980).

Spectacles

Spectacles correct the focus of the eye, permitting good vision through the eye's central portion. Vision is distorted however by the magnification of objects in size by about 25 percent and the limited peripheral vision. Such distortions are a source of major disappointment for many persons who expected to have more normal vision as a result of surgery. Persons who have had a cataract removed from one eye, but retain normal vision in the other eye, cannot use spectacles to correct both eyes simultaneously due to the resulting difference in image size. Only persons who are not well-suited for intraocular lens implants and who are not able to wear contact lenses are recommended to use spectacles.

Refractive Keratoplasty

Keratomileusis, keratophakia, and epikeratophakia are surgical procedures that modify the corneal curvature in order to correct the large refractive errors produced by removal of a cataract (Barraquer, 1981). Keratomileusis involves the removal of part of the patient's cornea, reshaping it, and suturing the reshaped part to the original cornea (Swinger and Barraquer, 1981). In keratophakia, a cornea is obtained from a donor, reshaped to resemble a lens, and placed between layers of the patient's own cornea tissue (Liesegang, 1984). Epikeratophakia also involves the reshaping of a donor cornea, in this case to resemble a contact lens. This lens is sutured into place over the external surface of the aphakic eye. These procedures, as well as modifications of these techniques, are difficult ones to learn and are relatively experimental.

RECENT AND FUTURE ADVANCES IN CATARACT SURGERY

In July 1982, the Neodymium:YAG laser was introduced for use in cataract surgery. The laser is used for nonsurgical removal of the posterior capsule if a secondary membrane develops (U.S. DHHS, 1984). A "secondary" cataract can thus be eliminated by laser during a relatively brief outpatient visit. Currently, YAG laser treatments are reimbursable through Medicare--although as of yet, no specific procedure code (under Current Procedural Terminology) has yet been identified for this procedure. Some 20 to 40 percent of cataract patients are estimated to have secondary opacification of their lens. In the past they would have been treated in the office under a slit lamp by insertion of a needle to open the capsule. The use of the YAG laser reduces the serious (but apparently rare) complications that accompany opening the capsule with a needle. The

relative cost-effectiveness of this non-invasive YAG laser procedure is open to question.

Research is on-going in the area of innovative and improved types of intraocular lenses. Efforts are currently underway to develop flexible intraocular lenses which can be inserted into the 3 mm limbal incision made during the phacoemulsification procedure. Currently, the incision required for phacoemulsification must be widened in order to insert a lens, negating one of the advantages of this procedure. Other long-term research is being done in externally programmable variable focus lenses and injectable IOLs (BBI, 1985).

Research is in progress in the area of plastic implants within the corneal tissue in an attempt to modify the refractive characteristics of the cornea. Efforts are also being made to develop drugs aimed at preventing cataracts (Terry et al., 1985). Certain drugs are at present being tested on animals, but it is likely that it will be a long time before drugs of this type will be available to the general public.

SECTION 3
ECONOMIC ASPECTS OF CATARACT SURGERY

INTRODUCTION

With the number of cataract surgeries performed in the United States increasing and since a large percentage of these operations is covered by Medicare, total Medicare expenditures for lens procedures continue to increase as well. Determining the total cost of cataract surgery to Medicare would be quite complicated, however, since the procedure can be performed in a variety of settings, involves several different inputs, and reimbursement policy varies by the setting. In addition, significant regional variation exists in allowable charges for physician services.

The following section will attempt to clarify Medicare reimbursement practices for cataract surgery by reviewing the basics of the reimbursement system and examining differences in Medicare expenditures between settings. Next, recent utilization and expenditures patterns for cataract surgery will be discussed. Finally, data on physician supply are presented, and market relationships among the supply of ophthalmologists, rates of cataract extraction, and physician charges are examined.

MEDICARE REIMBURSEMENT PRACTICES

The amount of money reimbursed by Medicare for cataract surgery is determined by a complex and often confusing formula. Both patients and physicians alike are often uncertain as to exactly how reimbursement amounts are calculated. At present, Medicare reimburses for physician services at different levels depending on where the procedure is performed. Other

inputs, such as operating room time, equipment, lenses and other supplies, are also reimbursed at different levels according to surgical setting. Table 1 summarizes the Medicare payment provisions for different settings and resources. Table 2 presents ranges of estimated charges to Medicare for each type of resource in each setting. The payment provisions in Table 1 must be applied to the charges in Table 2 to determine the patient's versus Medicare's payment in each instance.

Physician and Inpatient Coverage

Physician services for Medicare beneficiaries are paid for under Part B, which also covers outpatient services and requires a premium payment by the beneficiary. The amount paid for a physician service is determined through a fee screen system called CPR ("customary, prevailing, and reasonable"). For covered services, the amount paid by Medicare is a proportion (usually 80 percent) of the "allowable charge," which is the lowest of the physician's actual charge, the physician's customary (or usual) charge for the service, or the charge commonly prevailing in the mean (defined as the 75th percentile in the area charge distribution but constrained in its rate of increase by the Medicare Economic Index).

A Medicare beneficiary with Part B coverage must pay a standard yearly deductible for physician and other outpatient services, which as of January 1, 1984 was \$75. In addition, the patient is usually liable for 20 percent of the cost of services above the deductible. However, the amount of out-of-pocket expenses to the patient varies depending on whether a physician accepts assignment, on whether the beneficiary has supplemental insurance coverage, and on the type of setting in which the procedure is

Table 1.--Medicare Coverage of Cataract Surgery by Setting and Type of Resource Input

Resource	Setting			
	Inpatient	Hospital Outpatient	Certified Ambulatory Surgery Center	Noncertified Ambulatory Setting
Ophthalmologist's time	Part B pays 80% of allowable. Subject to deductible	Part B pays 100% of allowable under assignment (not subject to deduct- ible); 80% other- wise (subject to deductible)	Part B pays 100% of allowable under assignment (not subject to deduct- ible); 80% other- wise (subject to deductible)	Part B pays 80% of allowable. Subject to deductible
3-3 Assistant surgeon ^a	Part B pays 80% of allowable	Part B pays 80% of allowable	Part B pays 80% of allowable	Part B pays 80% of allowable
Anesthesiologist	Part B pays 80% of allowable	Part B pays 80% of allowable	Part B pays 80% of allowable	Part B pays 80% of allowable
Hospitalization (Room and ancillaries)	Part A pays under PPS (DRG 39) sub- ject to deductible and copayment	Not applicable	Not applicable	Not applicable
OR time, equipment, and supplies	Part A pays under PPS subject to deductible and copayment	Part B pays 80% on reasonable cost basis	Paid by Medicare as Level 4 ASC	Not reimbursed
IOL	Part A pays under PPS subject to deductible and copayment. Nothing extra for IOL.	Part B pays 80% on reasonable cost basis	Part B pays 80% on reasonable cost basis	Part B pays 80% on reasonable cost basis

^aUsually about 20% of surgeon's fee.

Table 2.--Estimated Per Case Charges to Medicare Patients for Cataract Surgery by Setting and Type of Input

Resource	Setting			
	Inpatient	Hospital Outpatient	Certified Ambulatory Surgery Center	Noncertified Ambulatory Setting
Ophthalmologist's time	\$ 960 - 2000	\$ 960 - 2000	\$ 960 - 2000	\$960 - 2000
Assistant surgeon	\$ 440 - 600	\$ 440 - 600	\$ 440 - 600	\$ 440 - 600
Anesthesiologist	\$ 200 - 550	\$ 200 - 550	\$ 200 - 550	\$ 200 - 550
Hospitalization	\$1200 - 1500	Not applicable	Not applicable	Not applicable
OR time, equipment, and supplies	(Included in DRG payment)	\$1000 - 2000 (includes lens charges)	\$ 485 - 553	Not reimbursable
IOL	(Included in DRG payment)	\$ 250 - 790	\$ 280 - 400	\$ 144 - 408

Source: Based on tables in Kusserow (1985).

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performed. With regard to other surgical resources, such as OR time and IOLs, out-of-pocket costs vary according to the level of supplemental insurance coverage, the type of surgical setting, and a patient's recent hospitalization history (only applicable to hospital inpatient care). From the physician's standpoint, total reimbursement for services performed is dependent on many factors including the amount charged, type of surgical setting, acceptance of assignment or not, the amount and types of the patient's supplemental insurance coverage, and the patient's ability to pay.

For inpatient procedures, Medicare Part B pays 80 percent of a physician's CPR fee as well as those of selected surgical team members--anesthesiologist, surgical assistant, and consulting physician. For this procedure, an ophthalmologist's fee generally covers presurgical prep time, surgical time, cataract extraction, IOL implantation (if performed), and postoperative care needed to stabilize a patient's condition (usually up to 12 weeks). A physician who is accepting assignment for a case can bill Medicare directly for 80 percent of the allowable fee. The remaining 20 percent is billed directly to the patient or the patient's supplemental private insurer. If not under assignment, the physician bills the patient directly for 100 percent of the actual fee. A Medicare beneficiary can then request reimbursement from Medicare for 80 percent of the attending physician's allowable fee. In either case, Medicare will pay a maximum amount of 80 percent of the allowable physician fee for cataract surgery.

Wide variation exists among maximum allowable charges by physicians for cataract surgery. These charges vary among states and regions as well as within a state. For example, the maximum allowable charge in Minnesota ranged from \$825 to \$928 in 1984. In California, charges were much higher, ranging from \$1,054 to \$1,786 (HCFA, 1984). This amount of variation is

common to many physician procedures reimbursed under Medicare (Jencks and Dobson, 1985).

Hospital resources required for inpatient cataract surgery, including the prosthetic intraocular lens, are reimbursable under the DRG payment system. Items covered by the DRG payment include operating room time, surgical equipment and clothing, anesthesia, and other supplies. Cataract surgery falls under DRG 39, Lens Procedure, the second most frequent DRG during FY 1984, and 98 percent of DRG 39 cases in 1981 involved cataract removal or IOL implant (ProPAC, 1985).

An approximate average payment for DRG 39 (before adjustments) can be estimated by multiplying its DRG weight by the national urban standardized amount. In FY 1985, using a weight of .4958, the average payment would total \$1,480. With adjustments for area wage differences, hospital teaching status, etc., hospitals under PPS in FY 1984 had an average payment per case of \$1,148 (ProPAC, 1985). The current weight for DRG 39 is slightly lower than it was in FY 1984; for FY 1986, it has been recalibrated upwards to .5721 (50 FR 35723)

ProPAC, at the request of the American Academy of Ophthalmology (AAO), recently examined PPS payments for DRG 39. AAO made this request because they believed that the current DRG reimbursement for cataract surgery was inadequate due to the changes which had occurred in cataract surgery since 1981--the base year upon which current DRG payments are based. Intraocular lens implantation, which is currently the predominant method of optical correction following surgery, was much less common in 1981. As a result, 1984 payments based on 1981 cataract surgery charges will not reflect the cost of an IOL which ranges in price from \$195 to \$395 (Stamper et al., 1984).

ProPAC (1985) noted in their first annual report that 1) the percent of procedures involving IOLs had increased from 58 percent to 85 percent, 2) the most common type of IOLs had become the posterior chamber lens, and 3) utilization of ECCE had increased from 29.4 percent of all procedures to 51.9 percent. Also, between 1981 and 1984, it was noted that the use of Healon, a viscoelastic material, had increased, and more importantly, the average length-of-stay decreased from 3.2 days to 2.3 days for all discharges and to 2.1 days for discharges from hospitals under PPS. Because these changes are offsetting in terms of costs, ProPAC recommended that DRG 39 should be recalibrated to reflect these changes ". . . in the same manner as other DRGs to reflect changes in practice since 1981 . . ." (ProPAC, 1985). Thus, the recalibration for DRG 39 was part of a system-wide recalibration.

Outpatient Coverage

Physicians who accept assignment are reimbursed at 100 percent of their allowable fee and other surgical personnel at 80 percent for cataract surgery performed in an outpatient basis in either hospitals or Medicare certified ambulatory surgical centers (ASCs). Ophthalmologists doing cataract surgery in non-certified outpatient settings, such as private offices, are reimbursed by Medicare at 80 percent of the allowable fee. IOL and equipment reimbursement varies among the three outpatient settings, however. In a hospital outpatient setting, equipment and IOLs are reimbursable at reasonable cost. In a Medicare certified ASC, equipment and personnel are reimbursed under the Prospective Group 4 rate (47 FR 34084).

IOLs are reimbursed on a reasonable cost basis at 80 percent. For non-certified ASCs, no Medicare reimbursement is available for equipment charges, but IOLs are reimbursable under Part B at 80 percent of allowable charges.

Peer Review Organizations (PROs)

PROs, which were to be in place in each state by October 1, 1984, are responsible for monitoring utilization and quality of care for Medicare patients. Their main objective in monitoring utilization is to contain the growth of Medicare expenditures by reducing the number of unnecessary hospital admissions. With regard to cataract surgery, a majority of PROs have contracted with HCFA to reduce the number of procedures done in an inpatient setting by a particular number or percentage of procedures. Percentage reduction goals range as high as 95 percent in Maryland (AAO, 1985).

In recent Congressional testimony, the American Academy of Ophthalmology expressed concern that some PROs are attempting to turn cataract surgery into an outpatient only procedure without proper concern for individual patient needs. Based on a review of screening criteria used by PROs in 18 states, they noted that only six PROs permit consideration of additional factors in determining a person's eligibility for inpatient cataract surgery. Six PROs require a person to have extremely severe medical conditions, such as renal failure, in order to qualify for inpatient care.

PROs are intended to provide quality assurance within the Medicare PPS. When they promulgate guidelines and goals such as those developed for

cataract surgery, their scope of influence expands beyond inpatient care alone to the costs and quality of care in the entire system. Indeed, HCFA administrator Carolyn Davis stated in recent congressional testimony that medical reviews by PROs had already led to the decline of inpatient cataract surgery from the second most frequent inpatient procedure to the sixth most frequent procedure. The AAO has disputed the validity of this claim, stating that the drop in inpatient cataract surgery cases was due to administrative actions begun prior to recent PRO activities. Recent technological advances have made it technologically feasible to perform high-quality cataract extraction on an outpatient basis. It seems likely that this increased feasibility, the establishment of PRO guidelines, and the incentives under PPS have all three played a part in the shift to the outpatient basis.

UTILIZATION AND EXPENDITURES

Utilization

The number of cataract operations being performed in the United States has been increasing steadily over the last 15 years. According to estimates from the Hospital Discharge Survey (HDS) from the National Center for Health Statistics (NCHS), approximately 171,000 inpatient cataract extractions were performed in 1971. By 1983, the number of extractions had risen to approximately 630,000, an increase of over 268 percent (see Table 3.) Similar utilization rates are indicated by data available through the Hospital Record Survey (HRS) of the Commission on Professional and Hospital

Table 3.--Estimated Number of Operations on Lens for Inpatients Discharged from Short-Stay, Nonfederal Hospitals--1980 to 1983

RATE PER 100,000 POPULATION				
Year	All		65 Years and Over	
	Lens Extractions	Insertion of Lens	Lens Extractions	Insertion of Lens
1980	209	86	--	--
1981	237	130	--	--
1982	261	182	1708	1257
1983	271	222	1826	1559

VOLUME IN THOUSANDS				
Year	All		65 Years and Over	
	Lens Extractions	Insertion of Lens	Lens Extractions	Insertion of Lens
1980	467	191	--	--
1981	540	297	--	--
1982	599	418	458	337
1983	630	516	500	427

Source: NCHS Hospital Discharge Survey, 1980-1983. See NCHS (1985) for explanation of survey.

Activities (Stark et al., 1984). Obtaining a precise estimate of the number of cataract operations performed annually has become increasingly difficult because of the previously cited shift to an outpatient basis and because few data are available on those procedures performed on an outpatient basis.

Because lens insertion has become routine following cataract extraction (see Table 3), estimates of lens implant volume now provide a better indication of the total volume of cataract surgery. Through survey of IOL manufacturers by the Food and Drug Administration (FDA), more accurate data are available on the number and types of intraocular lens being implanted in the United States. Between February 1984 and February 1985, approximately 817,000 IOLs were implanted--78 percent of the posterior chamber type (Stark, 1985). These latest figures reflect the continuing trend toward higher utilization of IOLs and of cataract surgery in general--a 29 percent increase in IOLs over the previous year. For the same period a year earlier, a recent article by Stark et al. (1984) indicated that 631,000 IOLs were implanted. From August 1983 to February 1984, the majority of these lenses were of the posterior chamber type--69.4 percent. This represented a nearly 12 percent increase in posterior chamber lenses over the prior year (Stark et al., 1984).

The figures of Stark et al. (1984) underscore the dramatic increase in the insertion of posterior chamber lenses. The rise in these types of lenses has corresponded to a decline in the use of iris fixation and iridocapsular lenses. They fell from 38 percent of insertions in mid-1980 to less than 2 percent by 1984 (Stark et al., 1984). The use of anterior lenses went from 32 percent to 30 percent over this same period, though usage reached 41 percent in mid-1982. The latest figures (Stark, 1985) suggest that use of anterior chamber lenses has declined even further to

approximately 22 percent. Although these FDA-based data on IOL insertions include both primary (i.e., immediately following extraction) and secondary insertions (i.e., at a later time or as a replacement), they do not allow a precise separation between the two. Stark et al. (1984) estimate, however, that a much greater proportion of anterior implants are done secondarily, as compared with posterior implants. The increasing use of posterior lens implant is mirrored in the data on method of extraction. ProPAC (1985) presents HDS data showing an increase in ECCE from 29 percent of extractions in 1981 to 52 percent in 1983 among hospital inpatients age 65 and over.

A survey of ophthalmologists, conducted in early 1984 by Dowling and Bahr (1985), provides further documentation of these trends as well as some additional insights. They found a high usage of both IOLs and ECCE. As of early 1984, 70 percent of the 387 ophthalmologists surveyed performed less than one-half of their operations on an ambulatory basis. However, of these respondents, 78 percent indicated that they expected to switch to an ambulatory basis in the future. Ophthalmologists in the South and West were more likely to do ECCE, IOL implants, and ambulatory surgery.

The post-1980 growth in cataract extraction continues a trend that has occurred since the late 1960s. As Table 3 suggests, population growth is only one factor. Trends in cataract surgery in the U.S. for the period 1968-76 were examined by Nadler and Schwartz (1980). They demonstrated that the 53 percent growth in the annual volume of ICCEs, the predominant method during this period, could not be attributed to either population growth or changes in age distribution. They indicated that a range of medical, social and economic factors including the growth of public insurance coverage and changes in surgical indicators were responsible for the difference. They also noted that from 1966-78 the average LOS decreased from 7.6 days to 4.8

days. This trend has continued with the average LOS decreasing from 3.2 days to 2.3 days between 1981 and 1984 (ProPAC, 1985). A number of factors, including improvements in surgical procedures and technologies, have contributed to this decline.

Despite the continuing growth in the aggregate amount of cataract surgery, significant regional and inter-area differences exist. As has been emphasized by Wennberg (1984), this phenomenon is common to much of surgical practice. He cited lens operations as one of a number of procedures which show high variation across small areas of the country. He attributes this phenomenon to the "practice style factor"--a group of subjective factors related to personal attitudes of each practicing physician. Nadler and Schwartz (1980) also noted variations in the rate of lens extraction by region: the South had a significantly lower rate of extraction throughout the early 70's.

Table 4 presents regional estimates for 1983, which is probably the last year for which inpatient data will provide a usable estimate. The rate of cataract extraction per 100,000 population is the lowest in the South, though not far below the Northeast. Indeed, the rate of IOL implantation is higher in the South than in the Northeast. Rates of both extraction and implantation are higher in the North Central and West. Interestingly, the South and West have higher rates of implantation relative to extraction. This accords with the findings of Dowling and Bahr (1985) cited above.

The consequences of practice variation are borne by both patients and payers of care alike. Recent testimony before the Senate Special Committee on Aging focused on the potential cost savings to Medicare of reducing "unnecessary" elective surgery through the use of second opinion programs. Cataract surgery was one of the procedures considered to be done

Table 4.--Regional Differences in Lens Operations, Rates (per 100,000 population) for Inpatients Discharged from Short-Stay, Nonfederal Hospitals, 1983.

LENS PROCEDURE	REGION			
	Northeast	North Central	South	West
Total Extractions	235	335	226	307
Lens Implants	182	267	198	251
At time of extraction	168	252	188	236

unnecessarily a significant proportion of the time. However, the estimates are of questionable relevance to Medicare since they are sometimes based on Medicaid populations or may be out of date because of recent technological changes in cataract surgery. In any case, the estimates of savings for Medicare must be treated with caution for other reasons as well. The potential cost savings of second opinion programs are likely to be overstated from society's point of view because the benefits to patients of unnecessary surgery are ignored.

Consider the following definition: unnecessary surgery operations are those for which the expected benefit to the patient is less than the expected incremental cost to society (Pauly, 1979). With regard to cataract surgery, there might be two types of unnecessary surgery. One type would be when the cataract is removed early in the progression of the disease before vision has greatly deteriorated. After IOL insertion, the net improvement in vision may be small, yet the patient could have good vision. A second type would be when the IOL insertion does not improve vision much for a person with other serious eye problems. Vision may improve slightly, but remains poor. In both cases, it is more a question of small, but positive benefits, rather than an adverse outcome for the patient. No study has yet estimated the frequency of these types of outcomes. Thus, it is impossible to estimate the net loss to society from unnecessary cataract surgery.

This also raises an issue that has been cited by the Inspector General (Kusserow, 1985) and others (Taylor, 1981): A very small percentage of ophthalmologists appear to engage in what are sometimes called "cataract surgery mills." They are involved in hundreds of procedures a year and receive hundreds of thousands of dollars from Medicare. The impact of such assembly-line medicine on quality of care is unknown. Because of economies

of scale, it certainly reduces costs (if only in terms of surgeon's time), but since average revenue per procedure is constant, the ophthalmologist receives a huge income. There would seem to be gains in access to care through such practice, but questions of unnecessary surgery and quality of care need to be addressed.

Prices, Incomes, and Expenditures

Prevailing charges (as defined under the CPR reimbursement system) for physicians for cataract surgery vary widely among states as well as within individual states. For 1984, prevailing charges, which represent the maximum amount reimbursable under Medicare provisions, ranged from \$687 in Nebraska to \$1786 in California (HCFA, 1984). It has long been known (Institute of Medicine, 1976) that variations in Medicare prevailings cannot be well explained by cost-of-living differences although there is some relationship. In addition, Mitchell et al. (1984) found significant variation in total physician charges--including surgeon, anesthesiologist, assistant surgeon, and other surgery--for DRG 39 between New Jersey and North Carolina. Total charges were 42 percent in New Jersey, which was higher than in North Carolina. They estimate that half of this differential can be attributed to greater service intensity and the remainder to a higher cost-of-living in New Jersey. Differential utilization of assistant surgeons was responsible for the vast majority of the noted service intensity variation.

As background, it is useful to compare not only prevailing fee levels across geographic areas, but also prevailings for cataract surgery with other procedures and incomes of ophthalmologists with incomes of others.

Though based on data from an earlier period, Hsiao and Stason (1979) present evidence that office visits and nonsurgical procedures are generally significantly underpaid as compared to surgical procedures. They found that ICCE provided, by a large margin, the highest hourly physician remuneration among a set of common surgical procedures in the late 70s. Currently, with the cataract extraction/IOL procedure running between 45 minutes and one hour and a half in duration, fees of over \$1000 imply large hourly compensation, even after accounting for several follow-up visits. And the hourly remuneration is certainly much higher than for comprehensive eye exams, for which the prevailing fee is roughly between 35 and 50 dollars. When relative rewards do not reflect relative costs, there is a potential for distorting the behavior of physicians and patients away from what is socially cost-effective.

Finding that ophthalmologists are relatively well-rewarded for cataract surgery does not necessarily mean that they are overpaid: They may simply be underpaid for other procedures. This raises the question of how they stand relative to other physicians and other professionals. Reliable estimates of the incomes of ophthalmologists are not readily available--the AMA's Socioeconomic Monitoring System which provides the most up-to-date estimates of physician incomes, does not sample enough ophthalmologists to prepare an annual estimate. Estimates for 1981 from a Medical Economics survey (Owens, 1983) suggest that they still earn more than the average physician, but that the relative differential has narrowed. In general, physicians' average real incomes (adjusted for inflation) did not change during the 1970's (Glandon and Shapiro, 1981)--this occurred in the face of a significant increase in physician supply. Recent anecdotal evidence suggests considerable downward pressure on physician's net incomes due to

fee discounting resulting from competition and to increasing malpractice premiums. As in the 1970's, however, the latest AMA (1984) figures do not show a decline in either nominal or real income. For 1983, average nominal income (before taxes) for surgeons was \$145,500, an increase from 1982's average of \$130,500. The median nominal income for all physicians grew from \$112,000 in 1982 to \$125,000 in 1983.

That ophthalmologists earn more than less specialized physicians seems appropriate given the additional training and skill required. Whether the observed differential is appropriate is unknown. Dresch (1981) determined through sophisticated econometric estimation techniques that physicians' training is in general a very profitable investment compared to alternative occupations. He estimated in addition that the rates of return for ophthalmologist training are over 20 percent higher than those for family practice training, a specialty which is itself a profitable investment. He argues that this evidence supports the hypothesis that the medical profession wields substantial monopoly power.

Economists have claimed (Sloan, 1970; Dresch, 1981; Burstein and Cromwell, 1985) that physicians on average earn excess profits or monopoly rents, presumably due to restrictions on entry. As has been pointed out frequently by other economists (see, for example, Reinhardt, 1984), since physician expenditures are only 20 percent of total health expenditures, reducing them by even 10 percent would make only a small difference in total expenditures. In summary, although relative prices and incomes in physician markets are distorted for numerous reasons, it is not clear, for example, how much the price of cataract surgery should be reduced to correct the distortions. Furthermore, the answer depends on what is done to other prices in the system.

According to estimates by ProPAC (1985), the costs to Medicare as well as charges for cataract surgery on a per case basis have risen between 1981 and 1984. In 1981, average total charges were \$1683, with Medicare paying \$825, or 49.0 percent of charges. For discharges under the PPS in 1984, charges were \$2,312 per case and payments were \$1148, or 49.5 percent. This increase occurred despite the fact that average length of stay fell from 3.2 to 2.1 days. ProPAC (1985) attributes the low payment-to-charges ratio on several factors: 1) many cataract patients are subject to a deductible (\$356 in 1984) because the extraction is likely to be their first admission within a spell of illness; and 2) non-reimbursable charges for short hospital stays, such as private room charge differentials.

As shown in Table 2, comparing Medicare expenditures for cataract surgery in different surgical settings (excluding non-certified ASCs), Medicare certified ASCs appear to be the least costly setting. Given that only ranges of estimates are available from the Inspector General's study, it is difficult to make precise comparisons. Furthermore, attention must be paid to the difference between payments by Medicare and total payments. Physician charges (for the ophthalmologist, assistant surgeon, and anesthesiology) are more or less the same in each setting although the patient's share will be less in hospital outpatient and certified ASCs because of Medicare reimbursement rules. In practice, total physician charges and costs to patients may be least in ASCs (either certified or not) because the use of assistant surgeons and anesthesiologists may be less. The Office of Inspector General (1985) has argued that assistant surgeons are not needed for most routine cataract surgery. For the nonphysician component (including hospitalization and supplies), ASCs also appear less costly to Medicare and the patient. Indeed, care in the hospital outpatient

setting could turn out to cost Medicare more than inpatient care under current reimbursement rules.

The Inspector General (Kusserow, 1985) has argued that an excessive markup by suppliers and providers is being charged on IOLs, for which average charges are ranging between \$300 and \$400. Production costs appear far below this, and prices in Europe are much less. In addition, hospitals in the U.S. can purchase them on volume discounts for under \$150. Patients pay 20 percent of charges for these lenses when they are implanted on an outpatient basis.

Given that reliable estimates are unavailable on the volume of cataract surgery in various settings, it is impossible to develop a precise estimate of total expenditures (either to society or Medicare). Nonetheless, it is clear that cataract surgery is a big business in and of itself. With total charges running between \$3000 to \$5000 and volume approaching 900,000 procedures per year, expenditures are well over 2 billion dollars. This area is in the range of costs of the End-Stage Renal Disease program (\$1.8 billion in 1982, according to Eggers, 1984), which has received great attention because of its magnitude.

SUPPLY OF OPHTHALMOLOGISTS

According to the Bureau of Health Professions (BHP, 1985), the supply of practicing ophthalmologists stood at 13,680 in 1981. The supply of ophthalmologists in the U.S. is projected by BHP to reach 16,590 by the year 1990, an increase of 25.6 percent over 1981. By the year 2000, the supply is projected to total 19,090, an increase of 15.1 percent over 1990 figures. The Graduate Medical Education National Advisory Committee (GMENAC)

projected a supply of 16,950 ophthalmologists for 1990--nearly the same as those of BHP (Wills et al., 1981), though using a slightly different measure. Both projections of growth exceed that of the population, so that access to ophthalmological services in the aggregate should increase.

Wills et al. (1981) present the estimates of future needs for ophthalmologists generated by a "Delphi Panel" of physicians as part of the GMENAC study. The estimates of the Delphi Panel implied needs for 14,700 ophthalmologists in 1990. GMENAC reviewed these estimates and ultimately reduced the requirements to 11,600, seeing much less need in the care of refractive errors than did the Delphi Panel. Thus, GMENAC predicted a significant surplus based on the supply projection cited above. The estimates of the Delphi Panel implied need for 919 FTE ophthalmologists to deal with the cataract surgical workload. This was based on a projected 1990 procedure rate of 182 per 100,000 population and an average operative time of 1.7 hours. In contrast, the 1978 AAO Manpower Study estimated needs for 20,840 ophthalmologists in 1977, which--when inflated for population growth--would imply needs for 23,400 for 1990. This would suggest a shortage in 1990.

The significant difference between the AAO and the GMENAC Delphi Panel estimates is largely due to a longer patient care workweek and a smaller medical (i.e., nonsurgical) workload projected by the Delphi Panel (Wills et al., 1981). Although the median estimate of the Delphi Panel was 182 cataract extractions per 100,000 population, GMENAC revised this to 206. The AAO study used a rate of 156 per 100,000 population with an average procedure time of 1.5 hours. In 1983 the in-hospital rate alone was 271. Although there are indications that the average procedure time may have fallen slightly, the cataract surgery workload is increasing. The

substantial forecasting errors in both the GMENAC and AAO estimates and projections should make one hesitate about pronouncing on future shortages and surpluses.

If past trends continue, a growing supply of ophthalmologists should lead to better access to their services. Newhouse et al. (1982), using data on all physicians in 23 states, showed that all towns with population greater than 30,000 had an ophthalmologist in both 1970 and 1979. Over this nine year period, towns with population between 10 and 20 thousand experienced the most rapid growth in having an ophthalmologist present, increasing from 54 percent (of 182 towns) in 1970 to 62 percent (of 206 towns) in 1979. Towns smaller than this sometimes had ophthalmologists though there was only negligible growth in the percent of towns covered over this period.

Despite the diffusion of ophthalmologists to smaller towns, substantial regional variations exist. According to a study by Applied Management Sciences (AMS, 1983), the North Central region had the smallest per capita supply of ophthalmologists in 1979--4.62 per 100,000 population compared to 4.94 in the South, 5.86 in the West, and 6.62 in the Northeast for 1979. The ranking of regional distribution was unchanged from 1975. Based on AMA data for 1983, the supply of ophthalmologists (using a more restricted definition, viz., nonfederal, office-based, patient-care) varied by region as follows at the end of 1981: 4.04 in the North Central region, 4.44 in the South, 5.59 in the West, and 5.83 in the Northeast. Regional patterns change only slowly.

MARKET RELATIONSHIPS

Based on the preceding indicators of regional supply and the cataract surgery rates shown in Table 4, there is no simple relationship between the number of the ophthalmologists and the number of cataract procedures. The North Central region had the fewest ophthalmologists per 100,000 population and the highest cataract surgery rate among the four regions. The complexity of these market relationships is underscored by recent cross-sectional, multivariate analyses.

Relationships among the distribution of ophthalmologists and other socioeconomic factors were examined in a recent report done for the AAO (Orkand Corp., 1981). Contrary to expectations, there did not appear to be a positive correlation between ophthalmologist supply and the number of elderly in the general population. For the ten states with the greatest proportion of persons 65 years and over in 1979, the mean number of ophthalmologists per 100,000 was lower than that for all states--4.3 versus 5.0. The same result was noted by AMS (1983). That study also found a positive correlation between per capita income and ophthalmologist supply.

In its cross-sectional analyses of the supply of vision care providers in counties and states during the 1970s, AMS (1983) found a strong positive relationship between the supply of optometrists and ophthalmologists. There were more vision care providers of both types in states with higher income and greater populations; however, the percent of the population over age 65 was often negatively related to supply. Finally, controlling for other factors, the prevailing charge for lens extractions was positively, but not significantly, related to increases in supply.

Using more recent data from the Area Resource File (November 1984), several simple correlations among fee levels and ophthalmologist supply were

estimated by the authors for the 1110 counties that had at least one ophthalmologist in 1981. The correlation between the per capita ophthalmologist supply and prevailing charges for cataract extractions was positive and significant, but small (.08). There was a very high correlation (.95) between cataract extraction fees in 1984 and those for 1978. This suggests that regional variations have not changed over time under the CPR system. Correlations among prevailing charges for cataract extraction and eye exams in 1984 were lower (between .35 and .50). Though this partly is a function of less variability in eye exam fees, the relative charges for ophthalmology procedures (i.e., lens extraction versus eye exams) are clearly not as stable across areas.

In summary, there is little indication that relationships among fees, ophthalmologist supply, and cataract extraction reflect any simple economic logic of markets.

SUMMARY

This review of some of the economic aspects of cataract surgery suggests several findings relevant to alternatives for paying ophthalmologists for this procedure:

1. Given the excellent outcomes of IOL insertion and low complication rates, the demand for the procedure will grow as the population ages.
2. As with virtually all surgical procedures, Medicare allowables for ophthalmologist fees for cataract extraction vary greatly across areas of the country. Cataract surgery is an important

part of the ophthalmological workload, and results in a significant share of income for many ophthalmologists. The procedure appears to be a well-rewarded use of the surgeon's time. Some would argue that excess profits are being made.

3. The dramatic shift of this procedure to outpatient surgery will continue and is unlikely to be reversed. The cause of the shift is probably a function of both relative reimbursement (inpatient versus hospital outpatient) and PRO initiatives, reflecting perhaps a growing consensus among ophthalmologists that the patient is generally better served in an outpatient setting. However, the potential importance of the financial incentives should not be ignored.
4. The cost to Medicare of cataract extraction in a hospital outpatient department may be higher than in certified ASCs and even higher than in inpatient departments. The difference could be a combination of cost-shifting, excess profits, and inefficiency in the hospital setting.
5. The supply of ophthalmologists, both absolutely and on a per capita basis, will continue to grow. An improved geographic distribution can be expected to improve access. The impact of this on expenditures for cataract surgery is hard to predict, but seems unlikely to reduce either prices or volume under current payment arrangements.
6. Some are concerned about the volume of unnecessary cataract surgery although there is little hard evidence on the size of the problem. There are significant variations in procedure rates across small areas as well as larger geographic regions. The

patterns are too complex to be accounted for by a simple economic market model.

SECTION 4

ANALYSIS OF THE IMPACT OF ALTERNATIVE PHYSICIAN PAYMENT METHODS

INTRODUCTION

The preceding section demonstrated the complexity of Medicare payment for cataract surgery. The amount paid for this relatively homogeneous procedure varies greatly for two reasons. First, there is great variability in the allowable payment to physicians under Medicare's current CPR system. Second, there is variability in the payment to other providers depending on where the operation is performed, especially hospital outpatient versus certified ambulatory surgical center. Not only is the Medicare payment variable, but also the amount borne by the patient under cost sharing can vary greatly by setting, by whether the physician accepts assignment, and by the extent to which the patient has a Medigap policy. However, for purposes here the essence of the current system is that ophthalmologists derive greater income the more cataract surgery they perform, and that cataract surgery appears to be a relatively well-rewarded use of their time. Thus, reimbursement for cataract surgery typifies the incentives that characterize fee-for-service practice in general.

This section of the paper considers how alternative methods of paying ophthalmologists might affect the provision and cost of cataract surgery. The dimensions to be considered are shown in Table 5 and include efficient production, efficient use, access, quality of care, price, expenditures, and others. The questions addressed by each dimension are also shown in the table.

Four alternatives are considered:

1. modifications to the current CPR system,

Table 5--Definition of Impact Dimensions

Dimension	Questions
Efficient production	Is the output (i.e., extraction and IOL insertion) produced with the cost-minimizing set of inputs (ophthalmologist time and other resources)?
Efficient use	How closely do the benefits to patients correspond to the costs to society? Will the amount of unnecessary surgery change?
Price and expenditures	What is likely to happen to the price (physician and other charges) for the procedure and, considering the impact on volume, the impact on total expenditures?
Access	What is the likely impact on the patients' distance to the closest ophthalmologist who does lens extraction for Medicare patients? Is assignment affected?
Quality of care/ outcomes	From a clinical standpoint, how will outcomes be affected in terms of either complications or the improvement to vision?
Technology innovation and diffusion	Will a change in reimbursement slow the development of improved extraction techniques or new lenses? Will it affect the adoption of new techniques or devices by practicing ophthalmologists?
Financial risk-spreading	Is there a change in what party (ophthalmologist, hospital, ASC operator, patient) bears the risk for unexpected large costs?

2. use of fee schedules,
3. packaging of physician payment with other input payments, and
4. payment under capitation.

The method of analysis is to consider each option separately and compare its likely impacts on cataract surgery on each dimension with the current system. In the next section the various combinations of options will be considered, as well as the representativeness of the results for surgery in general.

This approach is based on the presumption that there is no one best pricing system for all markets, types of physicians, or times. Any pricing system represents a tradeoff among efficiency, equity, risk-spreading, access, quality of care, and other dimensions. The best pricing system in a given situation will depend on these tradeoffs.

It is easy to think of many mundane examples of different pricing for the same commodity. Bananas, for example, are usually sold in bunches and priced by the pound in supermarkets. This seems to make sense in that the edible part of the banana bears a more or less constant ratio to the gross weight. In other settings, such as cafeteria lines, bananas are sometimes priced on a per item basis. For gifts, bananas may be sold as part of a package deal in a fruit basket. When one considers the tradeoffs among transactions costs, the amount of product needed at the time, and other factors, it is not difficult to explain such patterns of pricing. The point is that no one pricing method is preferred in all situations.

THE CURRENT SYSTEM

Before analyzing each of the alternatives, it is useful to briefly review the current system. The current CPR system for paying for physician services is a type of fee-for-service system: a price is paid for each unit of service. Although the relative fee levels under CPR were originally based on historical charges, over the years--with growing levels and types of Medicare controls--it has gradually become a complex administered price system. As a result, historical regional variations in charges have become institutionalized and perpetuated over the years. The inflationary pressures inherent in the CPR mechanism (Yett et al., 1983) have made the Medicare Economic Index more of a factor over time. Once this constraint is effective, the ratio of prevailing fees across areas becomes fixed. Even in a fee-for-service system, some packaging of items must occur: the long time practice of packaging surgical procedures with related follow-up care is a prime example. This has been maintained despite the general tendency toward the unbundling of procedures (Mitchell et al., 1984) as well as a related expansion in the medical terminology to describe them.

Several features of the CPR reimbursement system are likely to affect the performance of cataract surgery. An important result of the institutionalization of historical charge patterns is that the relative prices, either for cataract surgery across different regions, or for cataract surgery versus other procedures, are unlikely to reflect their actual relative costs in terms of resource use. Differences in the relative profitability of procedures can be expected to affect the willingness of physicians to provide them. When Medicare adopted 100 percent reimbursement under Part B for outpatient surgery under assignment, this provided some incentive for ophthalmologists to move the procedure to an

outpatient basis, especially since patients need not pay a deductible or coinsurance. But until facilities were available and hospital administrators had some incentive to move the procedure out of the usual inpatient setting, the shift to outpatient surgery was gradual. As described above, changed Medicare incentives under PPS and PRO regulations have recently resulted in a dramatic shift of the procedure to an outpatient basis. But, under current reimbursement provisions, this has a greater impact on the cost that patients bear and the cost to Medicare than on the remuneration to ophthalmologists.

Assignment and the fee freeze are also important features of the current CPR system. Actually, the fee freeze and participating physicians program might be considered as options under the category of modifications to the CPR system. Conceptually, assignment on a case-by-case basis allows physicians to price discriminate among patients: Those who can bear more will have to pay a higher out-of-pocket amount (or their supplemental "Medigap" policy will). A change to assignment in all cases, as under the current participating physicians program, effectively reduces the average payment to physicians. For cataract surgery, this provision may interact with the reimbursement of outpatient surgery at 100 percent (i.e., no deductible and coinsurance) to limit greatly the ability of ophthalmologists to price discriminate.

The remainder of this section considers each of the four alternatives in turn, first, describing the incentives under each, and second, identifying the likely impacts related to cataract surgery.

EFFECTS UNDER MODIFIED CPR

There are many options available for altering the way in which physicians are paid under the current Medicare CPR system. For example, the percentile for setting the prevailing charge could be lowered; the frequency of updating of prevailings could be reduced (as under the current freeze); or inter-area differences could be eliminated. Most changes under consideration come to one result for cataract surgery: they either reduce the payment to all ophthalmologists for the procedure or they reduce the payment to selected groups of ophthalmologists, such as those who currently receive relatively high levels of reimbursement.

Lowering the percentile at which prevailing charges are calculated or updating the prevailing charge less frequently are examples which would tend to lower the payment for all ophthalmologists. Tying geographic differentials more tightly to costs of living would lower the payment for at least selected groups of ophthalmologists. It is also possible to lower the payment for the procedure by bundling some preoperative services into the current payment for the procedure although the amount of these services may be small in this particular instance. Allowing the discounting of fees resulting from competition among providers would also amount to a reduction in the fee to ophthalmologists. A slightly different option under a modified CPR would be to give beneficiaries a financial incentive--such as reduced patient cost sharing--to use lower priced physicians.

The essence of the preceding types of modifications is that they aim to reduce the current levels of payment for cataract surgery as well as other services. In general, they are unlikely to eliminate the biases that have been institutionalized in the relative rates of remuneration across specialties or among different types of procedures within a specialty. One

exception to this would be to allow carriers to negotiate discounts with providers. The negotiations might lead to a price which better approximates average cost. However, regional variations unrelated to cost may persist. At this point it would become difficult to draw a distinction between a modified CPR system and what some would consider a fee schedule, which will be discussed next. Even under the current CPR system, the charging patterns of local physicians becomes less relevant as the prevailing rate becomes constrained by the Medicare Economic Index. For analytical purposes, proposed modifications to CPR reimbursement can be thought of as a simultaneous reduction in the level and variability of payment for cataract surgery.

Table 6 summarizes the likely impacts, relative to what would occur without such a change, under this type of modification to the CPR system. It is assumed that a modified CPR would still result in separate payments to the anesthesiologist, a surgical assistant, and the operator of the outpatient facility. Given current regulations and patterns of practice, it seems unlikely that such a change in CPR would result in a shift back to the inpatient provision of cataract surgery. Thus, to the extent that outpatient provision is a more efficient setting, which seems likely, a modified CPR would maintain the current level of productive efficiency.

The major impact of such a change is that it reduces the absolute rewards to ophthalmologists for providing cataract surgery, both necessary and unnecessary. To the extent one believes that there is a significant amount of unnecessary cataract extraction, as some do, the reduced payment under a modified CPR system might reduce the amount. However, this could be offset by two factors. First, substantially lower per unit payments for surgery would reduce ophthalmologists' incomes greatly. They would be

Table 6--Relative Impacts on Cataract Surgery under Modified CPR

Dimension	Relative Impacts
Efficient production	Shift to outpatient provision would probably continue, which appears efficient on the surface.
Efficient use	Reduced rewards would lessen the payoff, to physicians of providing unnecessary care. But reduced costs to patients might increase their demand. Volume could go up or down. Proportion of appropriate care could change in either direction.
Price and expenditures	Total physician expenditures could rise or fall (relative to what would have happened otherwise), as may total expenditures. A fall seems more likely.
Access	In the short run, a reduction in incomes should not greatly affect the geographic diffusion of ophthalmologists. Reductions in fee levels (in urban areas) could encourage diffusion. A fall in the assignment rate as a result of lower prevailings would reduce access to care, increasing the out-of-pocket liability of patients.
Quality of care/ outcomes	Should not be greatly affected. Largely a matter of technology and professional standards. Little or no impact on lens quality.
Technology innovation and diffusion	Probably not greatly affected since lens reimbursement would still be separate. Current incentives to improve in lens quality would persist.
Financial risk-spreading	Similar to current situation. Physicians bear some risk (extra visits); ASC some (long CR times); Medicare bears some risk for hospitalizations; and hospitals some risk for long stays.

tempted to do more surgery. Second, the growing supply of ophthalmologists will increase the aggregate supply of ophthalmological surgery in any case. The total amount of unnecessary surgery could increase even if individual surgeons do less of it on average. As was discussed above, the seriousness of this problem is unknown.

Interpreting such changes from the patient's point of view is complicated by assumptions about assignment and special provisions for outpatient surgery. Lower fees for cataract surgery could mean less assignment, and therefore higher out-of-pocket costs to patients. Demand could fall. This could reduce volume and help to weed out some of the less necessary procedures. On the other hand, in competitive markets, 100 percent reimbursement for outpatient surgery (i.e., with no deductible or coinsurance under assignment) is a very attractive feature for patients. Ophthalmologists could move toward high volume, low cost production to take advantage of this provision. However, the incentive to do so would only be greater than it currently is because of increasing competitive pressures. Thus, the total volume of procedures could increase or decrease relative to what would occur otherwise, though a decline seems more likely. This, coupled with declines in per case remuneration, would tend to reduce physician and total expenditures, compared to what would occur otherwise.

A reduction in the variation in remuneration for cataract surgery would provide some incentive for ophthalmologists to abandon the high-reward urban areas, where the fees have historically been higher, for the areas of historically lower fees. This could, probably over five years or so, result in a greater diffusion of ophthalmologists so that geographic access is improved. Lower prevailings could lead to a fall in the rate of assignment. This could reduce access to care and increase out-of-pocket costs for some.

Or if mandatory assignment is the modification to CPR under consideration, then access, in theory, might worsen if ophthalmologists are willing to supply less at the lower price. In practice, given the relatively high rewards for this procedure even under assignment, access seems unlikely to be a problem.

Cataract surgery as it is currently practiced has already achieved the status of a highly technical and highly effective procedure. The current technique and devices are thus already a matter of professional standards and would most likely not be affected greatly by lower physician remuneration. Quality of care could fall, however, if practice shifts to assembly line medicine with little concern for appropriate follow-up care. Continuation of a fee-for-service system for physicians would have little or no impact on lens quality, which is most affected by the level of reimbursement available for lenses. To the extent that unnecessary surgery is reduced, the average outcome would improve.

Perpetuation of a fee-for-service system with separate payment for the lens would maintain the same incentive for technology and diffusion that exists under the current system. There are thus incentives for cost-decreasing lenses as well as cost-increasing lenses that provide better results for patients.

The sharing of risk among the various parties would be similar to the current situation. Physicians currently bear some small risk of the patient developing complications and requiring greater than the average number of visits in the follow-up period. The outpatient facilities bear some small risk for longer than average OR times or equipment use. And Medicare and hospitals bear some risk for hospitalization should complications occur. Costs to patients would not be greatly affected for those under assignment,

especially given the special outpatient provisions. However, if assignment were reduced, out-of-pocket liabilities would increase. It is difficult to predict whether this would be a major problem.

EFFECTS UNDER A FEE SCHEDULE

The preceding section suggested that the current CPR system becomes similar to a fee schedule if most of the allowable charges become constrained by the Medicare Economic Index. The CPR (or a modified CPR) system differs from a fee schedule primarily by a change in the method by which the relative fees are established. An important result of this would presumably be less variability in the amounts paid for a given procedure. This fee schedule option holds the definition of units of service to the same as those under the CPR system. The determination of the relative prices used in the fee scale could result from a variety or a combination of processes. They could be derived from estimates of the relative resource costs or relative charges, or from a consensus-based estimation of relative values by professional experts, or from a price determined by negotiation with providers. Medicare would presumably pay the same fee to providers of a given type or in a given area. Assignment could be mandatory or case-by-case. Depending on the fee level, access to care would be affected in either case.

The key difference between instituting a fee schedule versus continuing CPR or adopting a modified CPR is that a completely new origin for the fee schedule might reduce the amount of distortion in relative prices for different services, and secondly, that the system would be less complex to administer. Table 7 summarizes the relative impacts on various

dimensions of cataract surgery that are likely under a fee schedule. As under CPR and modified CPR, the procedure would probably continue to be done on an outpatient basis which currently appears to be the most efficient mode of production. The closer relationship of the fee schedule to relative costs and relative values would presumably provide a better indication of the cost and value of the procedure to society. The subsidy toward overprovision (i.e., moral hazard) that exists under any insured fee-for-service system would persist. Perhaps a closer approximation of the fee to average cost of production would result in an improvement in this tradeoff despite the fact that the net cost to the patient remains substantially below the total cost to society. The government and taxpayers would have a better idea of total cost of coverage for cataract surgery.

It can be assumed that a fee schedule would reduce the profitability of cataract surgery relative to other ophthalmological procedures. This would reduce incentives to provide both unnecessary and necessary cataract surgery. A fee schedule would thus result in lower physician and therefore lower total expenditures compared with current projections. The lower rewards would affect surgeons in the urban areas (those areas with relatively high fees) to a greater degree, so that the incentives for being in urban areas would be somewhat diminished over the long run. This may eventually improve geographic access to surgeons. Lower fees would reduce supply in given market areas, and could increase the financial burden on patients if assignment is not accepted. Given the projected increase in ophthalmologist supply, access seems unlikely to be a major problem.

In terms of surgical techniques used or the quality of lenses inserted, there is little reason to expect a shift to a fee schedule to have much impact. Again, as under a modified CPR system, lower fees could

Table 7--Relative Impacts on Cataract Surgery under a Fee Schedule

Dimension	Relative Impacts
Efficient production	Similar to current situation: shift to outpatient would continue. Would use same combination of inputs, which is presumed to be more efficient than inpatient surgery.
Efficient use	Should promote better use if price is closer to minimum average cost but (with moral hazard) the net effect is hard to judge. Lower relative rewards would decrease incentives to perform unnecessary surgery.
Price and expenditures	Relative reward for surgical procedure would fall. Physician and total expenditures would probably decrease relative to current trajectory, yet both will still probably rise.
Access	Would probably improve diffusion over the longer term and increase geographic access as ophthalmologists are encouraged out of urban areas because of fall in returns to surgery. Financial access could worsen if assignment is not accepted. Increases in supply will counteract access problems.
Quality of care/outcomes	Should not be greatly affected for procedure itself. Expect no impact on quality of lens. Could be an adverse impact on postoperative care, particularly for those with complications.
Technology innovation and diffusion	Probably not greatly changed since reimbursement for lens separate. Current incentives to improve lens quality would persist.
Financial risk-spreading	Similar to current situation: physicians bear some risk (extra visits, longer OR times); Medicare, hospital (and patient) bear risk for hospitalization due to complications. If assignment not accepted, patient burden would increase.

encourage high volume practices, and this may affect postoperative care. Outcomes could worsen for those with poorly handled complications. The extent to which this is currently a problem in high volume practices is unknown. This would also imply that the incentives for the development of improved lenses and other technological innovations would remain approximately the same as under the current system.

With regard to financial risk-spreading, a fee schedule would be similar to the proposed modifications to CPR. Complications result in greater use in physician's time for which they bear the risk. More serious complications can result in hospitalization for which Medicare bears the risk under PPS, and the hospital bears the risk that charges will exceed Medicare reimbursement levels. In addition, patient out-of-pocket liability could increase if assignment is not accepted. It is hard to predict whether this would be a major problem, especially if current special outpatient provisions continue.

EFFECTS UNDER PACKAGING

The term "packaging" of services is meant to imply that a greater number of inputs would be covered under a single fixed payment than is now the case. For example, ophthalmologists are reimbursed separately from anesthesiologists, assistant surgeons, and the provider of facilities and supplies. However, the current payment to the ophthalmologist is already a package in that it reflects payment for not only the procedure but for related postoperative care and the inputs that the ophthalmologist employs in the office.

There are a large number of alternatives for the packaging of services that vary along four different dimensions: 1) the scope of services covered might include some or all of ambulatory, physician, inpatient, and other supplies and services; 2) the recipient of the payment could be the physician, the hospital, a financial intermediary, or a corporate group practice; 3) the unit of payment could vary from an ambulatory case to an inpatient episode of care; and 4) the method of determining the fee level could vary from relative value scales to a charge-based determination. These dimensions and the numerous alternatives under each suggest a large number of possibilities for packaging. In order to make a comparison it is necessary to reduce this number to a plausible subset that capture the essence of what is intended by the notion of packaging.

The first alternative to be discussed is the MDDRG (i.e., medical doctor diagnosis-related group): a package that would include the payment to the physician on a diagnosis-related basis similar to the Medicare PPS, or even linked directly to the DRGs under Medicare PPS. Under the latter, the physician payment would be included as part of the relative weight under PPS. A question about the recipient of the payment would then arise: Should Medicare pay the hospital who would then pay the physician, or should Medicare pay some third party which would reimburse both? The question may be moot considering the recent rapid decline in inpatient cataract extraction, although there will always be some seriously ill patients requiring inpatient surgery. Thus, the plausible alternative becomes a fixed payment to the ophthalmologist or to the outpatient surgical facility that covers the physician fees, the cost of OR time, the lens, and other supplies.

Postponing for the moment the question of whom to pay, the issue of what to include in the package can be addressed. There could be a smaller package that includes only the ophthalmologist's fee, the assistant surgeon's fee, and the anesthesiologist's fee. A larger package would include the payment for hospitalization, OR equipment and time, and supplies, including the lens. Or there could be two separate packages. The major advantage of a larger package is that it does not distort the choice among the relative use of inputs, as does a system which attempts to set an administered price for each input. It implicitly provides an incentive to use inputs on a cost-minimizing basis. If the combination of inputs is considered to be more or less fixed, as would seem to be the case for outpatient cataract surgery, then the advantage of a large package is diminished as well. However, if an ambulatory surgery center is less costly to Medicare (either truly or because of overcharging by hospital outpatient departments), then including other inputs in the package might be beneficial with regard to the choice among outpatient settings.

The remaining choices in the care of the patient would seem to be: 1) using an assistant surgeon versus some other trained assistant, 2) using an anesthesiologist, nurse anesthetist, or ophthalmologist-administered anesthetic, and 3) using an ASC versus a hospital outpatient department versus a physician's office. It is not clear how many ophthalmologists would really regard these issues as matters of choice since local practice style may be an important factor.

Packaging the reimbursement in this fashion would shift much of the administrative burden from the Medicare carrier to the ophthalmologist, who would have to monitor charges by facilities, lens suppliers, anesthesiologists, and assistant surgeons. This does not appear to be a

good use of the time of ophthalmologists, though it might be a good use of the time of the business manager for the ophthalmologist or ophthalmological group practice. Currently, the weakest link in Medicare's cost containment efforts for this procedure is their inability to control cost in the hospital outpatient setting, which is reimbursed under a reasonable cost basis. Either a package, or a single flat fee comparable to the treatment of a certified ASC, would provide some protection for Medicare.

Indeed, ophthalmologists may well prefer to let Medicare set a flat payment level to cover facilities and supplies in all outpatient settings, rather than have to negotiate and purchase the inputs themselves. If the payment level is adequate, the ophthalmologist gets the inputs without much hassle. The major problem area is payments for other physician services: assistant surgeons, anesthesiologists, and consultants. Leaving this out of the package opens Medicare to substantial financial risk.

For purposes of this analysis, it is useful to consider the option of a packaged fee that includes not only physician inputs but also facility fees and charges for supplies. The impact would not be too different from a two-part package that separates the ophthalmologist's fee from the fixed, prospective facility fee. A hospital outpatient surgery facility would have to compete with a freestanding ASC for the ophthalmologist's business. It is important for cost-containment purposes to put the other physician fees in either of the two parts. Ophthalmologists would probably prefer not to have the problem negotiating with facilities and anesthesiologists to determine payment. They would prefer to have Medicare set the payment at an adequate level and take care of the billing. The problem for Medicare and its intermediaries is that they have much less knowledge of local conditions

and constraints than do ophthalmologists. It is assumed that postoperative complications that resulted in hospitalization would be covered under PPS.

As indicated in Table 8, packaging provides a greater incentive than fee-for-service medicine to use the cost-minimizing combination of inputs. The cost of cataract surgery to society for the procedure itself might be reduced through the use of nonphysician surgical assistants and the use of nurse anesthetists rather than anesthesiologists. Furthermore, such a package payment would presumably result in the optimal choice between hospital outpatient versus ASC care, which might well depend on local area population characteristics and existing facilities.

A packaging approach would provide the ophthalmologist, as the patient's agent, with a better understanding of the overall cost of the procedure and probably the out-of-pocket cost to the patient as well. If anything, this would seem to have some tendency to promote a more efficient use of the procedure in that the physician as agent will be more attuned to recommending a cost-effective course of action. On the other hand, ophthalmologists would tend to shy away from those patients who might have higher costs because of likely complications, though this appears a minor issue because the complication rate is low and because they might be handled on an inpatient basis.

Under packaging, the total charges for the procedure would be much more controllable; however, control of the volume of procedures remains problematic. The incentives for unnecessary surgery would be similar to those under modified CPR and a fee schedule. It is assumed here that the relative reward for cataract surgery would be reduced somewhat. Reduced per unit reimbursement might encourage ophthalmologists to do more procedures to offset the fall in income. Total physician expenditures (as a share of the

Table 8--Relative Impacts on Cataract Surgery under Packaging

Dimension	Relative Impacts
Efficient production	Greater incentive to use cost-minimizing production, which is probably outpatient surgery.
Efficient use	Should improve somewhat as doctors and patients see the total costs better; might reduce access for those with other complications.
Price and expenditures	Total charges for procedure would be more controllable and less inclined toward inflation. Still a problem in controlling volume and unnecessary surgery. Total expenditures should decline relative to what would have occurred otherwise.
Access	Would probably improve diffusion of ophthalmologists and therefore geographic access. Impacts on financial access would depend on assignment and copayment provisions.
Quality of care/ outcomes	Unlikely to fall in short-run because of professional standards and high-quality lens technology. Use of nonphysicians as substitutes could reduce quality of care. There might be some incentive to postpone hospitalization where it is appropriate. There would be less incentive to use higher quality supplies and lenses.
Technology innovation and diffusion	Would reduce incentives for new lens development and diffusion. Would encourage cost-reducing innovations.
Financial risk-spreading	Physicians would bear more of the risk of unexpected costs. Would probably negotiate fixed rate with anesthesiologists, assistants and OR operators to reduce variability. Then only major risk with regard to hospitalization. Under PPS, Medicare and hospital would bear part of this.

package) are likely to decrease relative to what would have occurred under the CPR system. Since a packaged fee set closer to average total cost would reduce the relative rewards for surgical procedures, the geographic diffusion of ophthalmologists might improve over the longer term, which would improve access. It is assumed that mandatory assignment applies. However, financial access could be affected by any changes in cost-sharing provisions.

In the very short run, the quality of care and resulting outcomes are unlikely to fall because of the continuation of current professional standards, which involve the use of high quality lenses. A shift to the use of nonphysicians for surgical assistance or anesthesia could result in lower quality of care and poorer outcomes. It is unclear whether the decline would be significant. Over the longer run there would be less of an incentive to use new and innovative lenses (if more costly). This would obviously reduce the incentives to develop more costly new lenses and for them to be adopted. There would be an incentive to adopt cost-reducing technological innovations.

Although the physician under a packaging scheme would bear much more of the risk of unexpected costs, in the case of cataract surgery this may be a small risk. The ophthalmologist would probably have little difficulty in negotiating fixed payment rates with anesthesiologists, assistants, or facilities. The remaining major risks would be hospitalization for complications, which would most likely be covered under Medicare PPS.

In sum, adoption of a packaging approach might do much to slow the rate of inflation in total charges for cataract surgery. Its ability to control the total volume of procedures and therefore total expenditures is less certain.

EFFECTS UNDER CAPITATION

The multitude of options under capitation parallels the multitude under a packaging scheme. Alternatives could vary with regard to scope of services covered, the recipient of the payment, the unit of payment, and the method of determining the level of the capitation amount. One major alternative is the option of capitating outpatient services (i.e., Part B) rather than capitating on the basis of Part A and Part B together. Or it would be possible to capitate physician inpatient care along with Part A. Or in the case of ophthalmology, the logical extension of packaging might be a fixed fee to provide all vision care for a Medicare patient. Such a scheme presents obvious difficulties since routine eye care is not a covered benefit. Ophthalmologists would be unwilling to bear the risk associated with sporadic demands such as cataract surgery. For this reason, this alternative is not considered here.

Capitation is discussed here primarily as a decentralized approach to physician pricing decisions. A fixed, capitated amount is given to a provider or insurer/provider organization (perhaps through a voucher) to cover all services (or perhaps outpatient services) for a Medicare beneficiary. The provider has discretion about how to pay physicians. The usual capitated schemes that come to mind include such entities as health maintenance organizations (HMOs), or individual practice arrangements (IPAs). For these types of organizations a fixed annual premium is paid to the carrier/provider organization, and the physicians are often paid on a salary basis, but may be paid on a fee-for-service basis. For example, these various capitated arrangements are allowed under current Medicare provisions whereby eligible delivery systems receive a fixed payment equal

to 95% of the average annual per capita cost for Medicare recipients in their area.

Other interesting but less tested versions of this model contemplate a physician gatekeeper in which a primary care physician or group of physicians accepts the premium payment. This gatekeeper manages the case of the individual patient with regard to all care or ambulatory services, paying for needed specific services on a per unit basis from the capitated amount. Such a model has some of the desirable properties of a prepaid group practice in that there is some incentive for the physician to prevent the provision of unnecessary service. A major difficulty facing this type of arrangement is the substantial risk that the individual physician might face. This risk must be limited through some mechanism, such as pooling or stop-loss provisions.

The key feature of capitation, as compared to the previously discussed alternatives, is the strong incentive to monitor and reduce utilization. The other methods provide some limitation on per unit cost, but by not controlling volume, they may not effectively control total costs. There is considerable evidence that inpatient admission and surgery rates are significantly lower for members of HMOs (Luft, 1981). Capitation, on the other hand, provides an incentive to underprovide care that must be guarded against. For example, there is some evidence that HMOs may underprovide necessary care as well as limit unnecessary care (LoGerfo et al., 1979).

An important aspect of capitation is that it decentralizes the decisionmaking about what type of pricing and utilization review is used in practice. Thus, for example, under an IPA arrangement an ophthalmologist might well be reimbursed on a fee-for-service basis by the carrier.

Presumably the carrier through utilization review and other monitoring devices would have sufficient control of utilization rates. Salaried physician arrangements are quite common under prepaid capitated practices, but other types of arrangements including packaged fees, fee schedules, and variable fees to different physicians are an option under these types of plans. Thus, the decentralization implicit in capitation allows greater flexibility in payment methods than do the previous three options.

With regard to cataract surgery, the details of the particular capitation scheme may not be essential for discerning the general impacts, but they may well matter when it comes to operating a capitation scheme in practice. For example, if the capitation payment is well above the expected actuarial cost of providing treatment, then there may be incentives for overutilization, unnecessary care, and delivery frills as the medical plans compete for patients. Table 9 summarizes the relative impacts along a variety of dimensions.

Capitation offers a much greater incentive for efficient production than the current method of reimbursement. It gives the provider an incentive to use the proper type of outpatient facility and the necessary amounts of ophthalmologist time and other ancillary physician inputs. The biggest problem with capitation is the incentive for underprovision and the use of lower quality inputs. Schemes such as the Enthoven plan (Enthoven, 1980) attempt to guard against this through a competition among providers, open enrollment, and other features. The level of protection that such safeguards would provide in practice remains unknown.

The price being paid per cataract extraction/IOL insertion under a capitated scheme may not be directly observable. However, theory would suggest that ophthalmologist reimbursement would be pushed to the point of

Table 9--Relative Impacts on Cataract Surgery under Capitation

Dimension	Relative Impacts
Efficient production	Greater incentive to use cost-minimizing production, especially if capitation covers inpatient and outpatient. Allows flexibility within the plan or organization as to method of ophthalmologist reimbursement.
Efficient use	Would be some incentive to underprovision. Key question: could that be offset by competition among plans/providers or controlled by other plan features?
Price and expenditures	Price would not be directly observable, but implicit price would fall. Total expenditures likely to fall since volume would fall.
Access	Probably would lead to greater diffusion of ophthalmologists which would increase access in mid-sized towns. But might reduce incentives for diffusion to the smallest size towns.
Quality of care/outcomes	Unlikely to fall in very short run because of professional standards and current high-quality techniques. But pressures to economize, perhaps by using less qualified assistants, would increase risk of complications.
Technology innovation and diffusion	Would greatly reduce incentives for new lens development and diffusion. Provides long-run incentive for prevention or drugs to prevent or slow cataract formation.
Financial risk-spreading	Provider/insurer would bear much of unexpected costs, especially if both inpatient and outpatient capitated together. Leaving Part A under PPS would shift much of risk to hospital.

minimum average cost, yet reflecting a fair rate of return to their educational investment or a return commensurate with peers under fee-for-service. In general, if payment for cataract surgery is excessive now, the fee implicit in the capitated amount will decline. Of course, the total expenditures attributable to cataract extraction would fall relative to what would occur under an extension of the current CPR system, and, if estimates of unnecessary cataract extraction are believed, then total volume might fall as well.

If implicit fees under capitation tend to correct current geographic distortions in fee levels, then access should improve. A decline in the returns to ophthalmological practice in urban areas which currently have high fees would eventually lead to a diffusion of ophthalmologists to mid-size towns. Providing services to less populated areas presents a major operational problem for a capitated approach. Financial access would depend on cost-sharing provisions and on assignment--though under capitated schemes these are less of an issue.

Once again, the quality of care and outcomes would not fall for the bulk of procedures in the short run. Average outcomes would go up if the amount of unnecessary cataract extraction is reduced. Quality of care would probably suffer as well as outcomes (for necessary procedures) because of the incentive to economize under capitation. The size of effect is unclear. Capitation would reduce the incentive to develop new models of lenses that are more expensive than current models, but would create an incentive for adopting less costly lenses. Capitation in principle provides a greater incentive for the prevention of cataracts and for the development of drugs that might slow the formation of cataracts. In practice, the basic research

ongoing in this particular area may not be sensitive to current reimbursement methods.

Under capitation schemes much of the risk of unexpected high costs would be shifted to the provider/insurer. If, however, Part A were left under PPS and only Part B capitated, then much of the risk of high costs would remain with Medicare and hospitals since the greatest costs are associated with seriously ill patients requiring hospitalization.

In sum, capitation schemes are attractive with regard to efficient production. Whether they can promote efficient use is the major question. Whether the market can function to assure access and quality remains a matter of debate.

SECTION 5
RESULTS AND POLICY IMPLICATIONS

COMPARISON OF ALTERNATIVES

The Medicare program has been a tremendous success on many dimensions. For millions of elderly Americans it has increased the availability of and access to high quality medical treatment. It has also substantially reduced the risk of catastrophic expenses for these same Americans. The peace of mind that this provides Medicare beneficiaries is no small achievement.

The current interest in physician payment reform addresses the major drawback of the Medicare system: its inability to contain the costs of medical care. This inability can be attributed to many factors, including overutilization of services, inefficient production methods, excess profits by some providers, excessive adoption of new technologies, and inflationary biases in the pricing system. Proposed alternative methods of paying physicians must deal directly with this cost-containment issue without sacrificing too much in terms of what has been achieved on these other dimensions.

The argument that Medicare is spending too much under CPR for cataract surgery is based on three types of potential excessive costs. First, there is the cost of unnecessary surgery. This represents that share of the total volume of procedures and related expenditures attributable to extractions that should not have occurred, presumably on the grounds that the expected benefit to the patient is far below the cost of the procedure to society. Second, there may be excessive costs to Medicare associated with excess profits by input providers. This could arise from

ophthalmologists earning excess profits in some areas of the country or hospitals earning excess profits by overstating costs (when the surgery is done on an outpatient basis). A third potential excessive cost, which is related to the second, would be the cost of using an inefficient mode of production, which could arise if ambulatory surgery centers are more efficient than hospital outpatient surgery. Identifying and measuring this third cost is not a straightforward matter. For example, it is not clear if the higher costs associated with hospital outpatient surgery under reasonable cost reimbursement are due to cost shifting from other patients or from a truly less efficient production process. In any case, the alternatives under consideration must be weighed with regard to their ability to address these potential sources of excessive costs.

With regard to unnecessary surgery, it may be the case that progress could be made under the current (or a modified) CPR system by requiring the PROs to monitor appropriateness of outpatient surgery or through the use of second opinion programs. The potential cost savings from the latter were recently estimated to be substantial by the Congressional Budget Office (CBO, 1985). As suggested above, it is easy to question the basis and methods of such estimates: In particular, cost savings to Medicare are not cost savings to society since even "unnecessary" procedures can be of benefit to the patient. However, this does not address the other potential sources of excessive costs and has the obvious drawbacks associated with a policing as opposed to an incentives approach. Utilization review under a modified CPR approach might also reduce unnecessary surgery. In addition, if such an approach reduces ophthalmologists' remuneration for cataract surgery, it addresses the second area of excessive costs. Reducing any excess profits by ophthalmologists would also have some effect on their

willingness to provide unnecessary surgery. What a modified CPR approach would not do (without utilization review) is to promote efficient production through the selection of the most appropriate production site.

A fee schedule approach would also provide a mechanism for eliminating excessive remuneration. But there would still be a tendency toward the provision of unnecessary surgery that might be controllable through PRO utilization review or through second opinion programs. A packaging approach has the major advantage over these fee-for-service alternatives of providing a stronger incentive for efficient production. Assuming the global fee for the package is set at a reasonable level, the provider would have an incentive to use the most efficient location and set of inputs.

Regardless of whether the recipient of the payment is an ophthalmologist or a provider facility, safeguards against use of low quality inputs (if the ophthalmologist receives the payment) or use of low quality ophthalmologists (if the provider receives payment) would be professional legal liability, market competition, and other regulatory controls. At present, there is little evidence that the types of input substitutions used (e.g., nonphysician assistants instead of assistant surgeons) result in noticeably worse outcomes. Review by PROs or surgical second opinion programs could also be used as a quality control as well as guarding against overutilization and unnecessary surgery.

Finally, the capitation approach provides the strongest incentives for efficient production of any of the alternatives. Efficient use is the problem. Will the capitated plan tend to underprescribe cataract surgery in necessary instances? (The incentive to reduce unnecessary care is clearly strong.) Would the capitated plan employ less skilled ophthalmologists

and/or lower quality inputs? Competition among capitated plans is the major safeguard against such abuses.

A pure capitation model has the advantage from government's point of view of putting a cap on total expenditures on behalf of Medicare recipients. It does not necessarily follow that the model requires a world of competing staff model HMOs, i.e., in the sense of prepaid group practices with salaried physicians. The competing plans could be a mix of IPAs, HMOs, or other organizations, such as private insurers, experimenting with gatekeeper models. Indeed, one major advantage of such a system is the flexibility it affords through decentralization. It allows Medicare to get out of the business of trying to design a pricing system that fits all markets in all situations.

Capitation models relying on competition are usually run as a voucher system. The Medicare beneficiary would be given a voucher for a fixed amount which can be used only to pay the premium in a qualified plan. The competition among plans is regulated; plans must provide at least the minimum set of services normally covered under Medicare. Competition among plans is expected to result in beneficiaries receiving a set of benefits valued at the premium amount. Because of economies of scale in delivery and insurance provision, such a competitive model may not work well in less populated areas of the country.

For such areas an applicable capitation model may be what is termed "regional capitation" (Burney et al., 1984). Under this concept one insurer/provider would receive the capitated amount to provide care for all the beneficiaries in a given geographic area. Presumably, the contract would be let through competitive bidding and contract performance monitored by Medicare. As with a voucher scheme, an advantage of this system is that

it decentralizes the decision-making about how to price individual services within the area. The regional insurer or provider could choose from a variety of schemes ranging from fee-for-service with utilization review to physician gatekeeper models.

EQUITY

The difference between these two types of capitated models brings to the forefront the important issue of equity among beneficiaries. Current payment patterns under Medicare's CPR system and under the PPS allow differential payments in different geographic areas of the country and especially between urban and rural areas. The rationale is presumably that input prices are different in different areas and that remuneration should reflect these differences. The evidence suggests that this adjustment is very imperfect. The result is what some would interpret as an implicit subsidy to the performance of surgery in urban areas. Furthermore, it is not obvious why these benefit payments should be indexed when the contribution rates (either the Part B premiums or the general revenue contributions to Part B) do not depend directly on geographic location.

The cost of living as well as practice costs are surely lower in rural areas, though not for all inputs. While it is true that wage rates and the rental cost of floor space are lower in rural areas, it may well be that supplies and other inputs are more expensive because of an inability to take account of volume discounts and increased charges for transportation. Paying physicians less in these areas discourages physicians from locating there, which increases the time and travel costs of Medicare beneficiaries

in these areas. This equity issue arises under any of the alternative methods for paying physicians under consideration.

At this time it seems likely that any transition to a capitated system will be a gradual one. The issues and questions that arise with regard to performance of cataract surgery under capitation are the same issues and questions that arise in general with this form of reimbursement. A gradualist approach to the implementation of a capitation or voucher scheme is appropriate. Until questions about the stability and viability (Price et al., 1984) are resolved, it is premature to move to full scale adoption.

SYSTEM-WIDE VERSUS SELECTIVE REFORMS

Thusfar the four alternatives have been discussed as system-wide reforms. It is possible, instead, to have a mixed or selective reform: 1) a partial adoption of capitation within a general CPR framework, as we now have; 2) selective controls on particular procedures: cataract surgery could be treated as a unique case; and 3) different areas of the country could experiment with different reimbursement systems. The current system is actually a mixed system with selective controls. For example, reimbursement for facility use and supplies in freestanding certified ambulatory surgery centers is handled differently from hospital outpatient reimbursement. And PROs are targeting specific procedures for review. Different states are experimenting with different reimbursement systems.

Although some have argued that the complexity of the CPR physician reimbursement system is one of its major drawbacks (Jencks and Dobson, 1985), it may be the case that selective controls would actually reduce the complexity rather than increase it. There is a tradeoff: singling out a

subset of procedures for a treatment under a more uniform fee schedule or packaging scheme would be more complex in that it sets up a two-part system. On the other hand, it might substantially reduce complexity by removing unjustified regional or intra-physician differentials.

Considered as system-wide reforms, the general drawbacks of each of the proposed alternatives are fairly obvious. A modified CPR may reduce excessive physician compensation, but the total savings from this are limited since physician payment comprises only about 20 percent of total costs. Thus, it does not deal well with the problem of overall system cost containment, and it seems unlikely to promote the most effective and efficient treatment patterns. A fee schedule has similar benefits and problems but with the additional limitation of requiring a bureaucracy to administer the price system. This is unlikely to improve efficiency in the long run.

Implementing a broader packaging scheme system-wide appears to have limited applicability for several reasons. For most types of illnesses it appears impossible to define the case or episode on a meaningful clinical basis that leaves cost variability manageable. It might be possible for a limited set of surgical procedures or DRGs that exhibit much less variability. However, this then raises the important issue of whom to pay. Bundling the physician and hospital payments under an MDRG system would tend to align the interest of the physician and hospital in terms of limiting care, which might not be in the patient's best interest. The current system at least provides a safeguard by giving the physician and hospital different incentives with respect to care for a given patient. With packaging, the incentive to over-provide or provide unnecessary surgery would persist for both doctors and hospitals.

In the case of outpatient surgery, such packaging might work better since there is less of an issue of limiting care through, for example, discharging or releasing the patient before they have recovered. A packaged payment for outpatient surgery would give the provider/physician a strong incentive to minimize costs. Packaging remains a form of fee-for-service reimbursement and thus may have incentives for unnecessary surgery or for an inappropriate assignment to inpatient versus outpatient. If it were medically appropriate for some patients (the most seriously ill) to receive inpatient surgery, then the relative rewards for inpatient versus outpatient performance would have to be considered. But if the percentage of such cases is small, then it may not be too costly to guard against under-hospitalization through professional liability mechanisms or over-hospitalization through peer review or second opinions.

TECHNOLOGICAL CHANGE AND COMPLEXITY

The importance of good vision in everyday life makes the results of cataract surgery, especially with IOL implantation, seem almost miraculous. For the prospect of going from near blindness in some cases to near 20/20 vision is something for which most individuals and their families would be willing to sacrifice a great deal. Certainly, many would be willing and able to pay much more than the few thousand dollars that the procedure currently costs.

The history of cataract surgery is replete with examples of fortuitous events and unexpected developments that have changed the nature of the technology. At one time, the AAO even took a stand against IOL insertion. In recent years there has been a dramatic technological change with a movement to posterior chamber insertion from anterior insertion.

Although this shift has been dramatic--from only 20 percent posterior in 1982 to 78 percent in 1984, the fact that 22 percent of insertions remain anterior raises some important questions. Although there is apparently a small percentage of patients for whom an anterior insertion is clinically preferred over a posterior insertion, the proportion may be far below 22 percent. The persistence of this rate of anterior insertion raises important questions about policies toward the adoption of new technologies. How is the reimbursement system to deal with apparently outmoded procedures? Should the rates have been adjusted to reflect the replacement of anterior by posterior insertion?

It is clear that the complexity of medical technology can present serious problems for an administered, fee-for-service system. In the case of cataract surgery, this is reflected in the nonuniform procedural terminology used around the country. Substantial uncertainty surrounds so simple an issue as whether ophthalmologists charge for IOL insertion separately from cataract extraction. Charging practices evidently vary around the country. As another example, establishing fees for new techniques such as the various types of refractive keratoplasty can be a complex problem.

Other types of technological change present similar problems. It is difficult to imagine significant improvements in effectiveness, given the current excellent results of IOL insertion and the low rates of complication. Nonetheless, if new surgical techniques or more costly, but effective, lenses are developed, most of the alternative payment methods discussed in this paper will pose dilemmas. For example, suppose a new, more costly lens makes a dramatic improvement even over current lens results. Given the high volume of cataract procedures projected to the

future, such a development would represent a major increase in Medicare expenditures. Indeed, this might even be large enough to make a noticeable difference in the average cost of all beneficiaries.

How are coverage decisions about such developments to be made? It would seem that the choices lie somewhere between an option which requires a coverage decision that gives some weight to cost effectiveness and not just efficacy (Ruby et al., 1985) or a system which provides a voucher that the beneficiary can apply to whatever plan (and coverage provisions) that he or she chooses. But even in the latter case, there would seem to be some necessity for Medicare to define the set of minimum benefits that must be provided by capitated schemes. The problem of coverage determination for new technologies may defy a market solution.

AGING OF THE POPULATION

There seems little doubt that the demand for cataract surgery will continue to be strong for years to come. The elderly population is expected to grow by 40 percent between 1980 and 2000 and another 45 percent by 2020 (Social Security Administration, 1981). The number of elderly persons in each age category will increase over these years; but perhaps more importantly in the near term, the proportion age 75 and over will grow even more dramatically. The increase in the incidence of cataracts with age will accentuate the demand for the procedure. As yet, there is no reason to expect medical breakthroughs that will either prevent the formation of cataracts or provide a nonsurgical remedy. However, with rapid growth in our understanding of basic biological phenomenon and organ transplantation, it is foolhardy to project too far into the future.

GENERALIZABILITY TO OTHER PROCEDURES

Although this discussion has addressed some of the general incentives under different alternative methods of paying physicians, it is useful to consider the separate issue of how representative the likely impacts on cataract surgery are for either surgery in general or for broader definitions of medical care. Cataract surgery is one of the most common surgical procedures, but generalizability to other surgery is obviously limited.

Defining surgery is not a simple matter. Past definitions have made distinctions with regard to general versus local anesthesia and the need for incision. At one time the use of an operating room would have sufficed as a definition, but the movement of surgery to outpatient facilities and physician offices limits this. From an economic point of view, an important facet of surgery is the economic interest that the surgeon has in carrying out the procedure. One could imagine a system under which the physician who diagnosed and recommended treatment might not be allowed to provide treatment because of the potential conflict of interest. But, of course, this potential conflict is not unique to surgery. Medical specialties such as nephrology face this issue in prescribing dialysis versus kidney transplantation for end-stage renal disease.

Another important economic aspect of surgery has been the reliance upon the hospital as an input. Although both the medical and surgical specialists use the hospital as a treatment setting for their patients, the use of high-cost surgical facilities makes the hospital a more important input in the surgeon's production process. Analysts (such as Pauly, 1980) have noted the problems that separating the control of hospital inputs from the medical staff creates. Physicians, especially under cost reimbursement,

have every incentive to use hospital facilities and personnel in place of their own time and office inputs. This would be one explanation for why many procedures that could technically be performed on an outpatient basis have long been performed on an inpatient basis.

Payment incentives with regard to cataract surgery may be more generalizable to other types of outpatient surgery, rather than procedures that must definitely be performed on an inpatient basis. As suggested above, it may be possible and even desirable to package these outpatient surgical procedures as a type of outpatient DRG system. Including the physician payment is less of a problem than for inpatient DRGs where early discharge can be an issue.

If Medicare were to develop an MDDR system for outpatient surgical procedures, there would still be issues of how to set the payment level and whom to pay. The fee for the package could be set under a fee schedule for the nation, or it might even be possible to engage in more innovative pricing schemes based on competitive bidding or even patient rebates (as suggested by Hay, 1983). It might be possible, for example, to set a fixed fee level and allow patients to share in any savings from using physicians who charge less than that packaged fee level or pay more for more expensive surgeons. The general problem with such schemes is that they might give patients an incentive to over-utilize low quality care or to even fraudulently report usage of care in order to gain income. However, for surgery the potential for such abuses may be limited. The extent of unnecessary surgery might not differ much in practice from that under the current system.

In sum, even if greater packaging might be desirable for reimbursing cataract surgery, it is not necessarily so for other major surgical

procedures. The data presented here on the cataract surgery and the discussion suggest that Congress and HCFA should look to the possibility of mixed, rather than system-wide reforms in the short run. The benefits of handling cataract surgery as a special case may outweigh the costs. Although one of the major problems with the current reimbursement system is its complexity, it is not obvious that special treatment or selective controls would always represent a net increase in complexity. For example, a system that packages physician payment with reimbursement under the certified ASC program would not represent a major increase in system complexity. It might even reduce complexity by eliminating the variation in physician payment levels across the country. If it turns out that a shift of hospital costs to outpatient care is undermining the cost savings of PPS, then the adoption of selective controls might result in considerable savings in the short run. However, greater packaging is probably not a workable solution for dealing with other nonsurgical outpatient use.

Given its importance in terms of costs to Medicare, cataract surgery would be a good candidate for a demonstration project on packaging. In any case, experiments on and attempts to implement voucher and capitation models should continue: They offer important lessons in market-generated price systems, and they can certainly coexist with centralized schemes.

- American Academy of Ophthalmology, Ophthalmology (Eye Physician and Surgeon) Manpower Studies for the United States, Robert D. Reinecke (ed.), October 1978.
- American Academy of Ophthalmology, "Medicare Peer Review Organizations," Testimony presented to the Senate Finance Committee, Subcommittee on Health, April 19, 1985.
- American Academy of Ophthalmology, Committee on Manpower and Planning, American Academy of Ophthalmology Manpower Studies, no date.
- American Medical Association, Physician Characteristics and Distribution in the U.S.-1982 edition, 1983.
- American Medical Association, Socioeconomic Characteristics of Medical Practice 1984, Roger A. Reynolds and Robert L. Ohsfeldt (eds.), 1984.
- Applied Management Sciences, Analysis of Distribution and Output of Vision Care Providers: Report on the Geographic Distribution of Vision Care Providers, Report to Bureau of Health Professions, Department of Health and Human Services Contract No. HRA-232-81-0017, Task No. 1, May 20, 1983.
- Barraquer, J.I., "Keratomileusis and Keratophakia in the Surgical Correction of Aphakia," Cataract Surgery and Its Complications, St. Louis, MO, pp. 199-220, 1981.
- Biomedical Business International, "Intraocular Lenses," VIII(9/10):81,90-92, May 28, 1985.
- Boon W., and Seymore, C., Jr., "Outpatient Cataract and Intraocular Lens Surgery," Journal of the National Medical Association 76(12):1201-1204, 1984.
- Bureau of Health Professions, Projections of Physician Supply in the U.S.- March 1985, 1985.
- Burney, I., Hickman, P., Paradise, J., et al., "Medicare Physician Payment, Participation, and Reform," Health Affairs 3(4):5-24, Winter 1984.
- Burstein P., and Cromwell, J., "Relative Incomes and Rates of Return for U.S. Physicians," Journal of Health Economics 4:63-78, 1985.
- Cavanagh, H., Bodner B., and Wilson, L., "Extended Wear Hydrogel Lenses," American Academy of Ophthalmology 87:871-876, 1980.
- Congressional Budget Office, Letter from Rudolph Penner to Honorable John Heinz, July 1, 1985.
- Department of Health and Human Services, "Medicare Program; Changes to the Inpatient Prospective Payment System and Fiscal Year 1986 Rates; Proposed Rule," June 10, 1985.

- Dowling J., Jr., and Bahr, R., "A Survey of Current Cataract Surgical Techniques," American Journal of Ophthalmology 99:35-39, January 1985.
- Dresch, S., "Original Wage Rates, Hours of Work, and Returns to Physician Training and Specialization," Health Care Financing Administration Contract No. 500-78-0054, no date.
- Eggers, P., "Trends in Medicare Reimbursement for End-Stage Renal Disease: 1974-1979," Health Care Financing Review 6(1):31-37, Fall 1984.
- Enthoven, A., Health Plan - The Only Practical Solution to the Soaring Cost of Medical Care (Reading, MA, Addison-Wesley Publishing Company, Inc., 1980).
- "Epidemiology of Cataract, (editorial)" The Lancet, p. 1392, June 19, 1982.
- Glandon, G.L. and Shapiro, R.J., "Trends in Physicians' Incomes, Expenses and Fees. 1970-1979," Profile of Medical Practice, American Medical Association, pp. 39-50, 1980.
- Hay, J., "An Incentive Reimbursement Plan for Medicaid Home Health Care Services," Robert Wood Johnson Foundation Grant #9028, Project Proposal, Princeton, NJ, 1983.
- Health Care Financing Administration, Medicare Directory of Prevailing Charges 1984, 1984.
- Hsiao, W., and Stason, W., "Toward Developing a Relative Value Scale for Medical and Surgical Services," Health Care Financing Review 1(2):28-38, Fall 1979.
- Institute of Medicine of the National Academy of Sciences, Medicare-Medicaid Reimbursement Policies, Committee Print 94-125 (Washington, DC), March 1, 1976.
- Jencks, S., and Dobson, A., "Strategies for Reforming Medicare's Physician Payments. Physician Diagnosis-Related Groups and Other Approaches," The New England Journal of Medicine, p. 1492, June 6, 1985.
- Kusserow, R.P., "Statement of Richard P. Kusserow, Inspector General, Department of Health and Human Services, Before Subcommittee on Health and Long-Term Care Select Committee on Aging," July 19, 1985.
- Liesegang, T., "Cataracts and Cataract Operations," Mayo Clinic Proceedings 59:556-567, 1984.
- LoGerfo, J., Efird, R., Diehr, P., et al., "Rates of Surgical Care in Prepaid Group Practices and the Independent Setting," Medical Care 17(1):1-7, January 1979.
- Mitchell, J., Calore, K., Cromwell, J., Freiman, M., and Hewes, H., "Creating DRG-Based Physician Reimbursement Schemes: A Conceptual and Empirical Analysis," Report to the Center for Health Economics

Research, Health Care Financing Administration Grant No. 18-P-98387/1-01, October 1984.

Nadler, D., and Schwartz B., "Cataract Surgery in the United States, 1968 - 1976--A Descriptive Epidemiologic Study," Ophthalmology 87(1):10-18.

National Center for Health Statistics, Detailed Diagnoses and Surgical Procedures for Patients Discharged from Short-Stay Hospitals-United States, 1983, March 1985.

Newhouse, J.; Williams, A., Bennett, B., et al., "Where Have All the Doctors Gone?" Journal of the American Medical Association 247(17):2392, May 7, 1982.

Office of Inspector General, U.S. Department of Health and Human Services, Review of Medicare Payments for Assistant Surgeon Services During Cataract Surgery, Audit Control No. 01-52001 (Washington, D.C.), June 7, 1985.

The Orkand Corporation, Cataract and Aphakia Related Services Under Medicare: Today and Tomorrow, American Academy of Ophthalmology, Washington, DC, November 20, 1981.

Owens, A., "Ophthalmologists: The Earnings Edge Gets Smaller," Medical Economics, February 21, 1983.

Pauly, M., "What is Unnecessary Surgery," Milbank Memorial Fund Quarterly/Health and Society 57(1):95-117, Winter 1979.

Pauly M.V., "Doctors and Their Workshops: Economic Models and Physician Behavior," University of Chicago Press, 1980.

Price, J., Mays, J., and Gordon, R., "Stability in the Federal Employees Health Benefits Program," Journal of Health Economics 2(3):207-223, December 1983.

Prospective Payment Assessment Commission, "Report and Recommendations to the Secretary, U.S. Department of Health and Human Services", April 1, 1985.

Reinhardt, U., "A Framework for Deliberations on the Compensation of Physicians," Testimony presented to the United States Senate Special Committee on Aging, Hearing on Physician Reimbursement, March 16, 1984.

Ruby, G., Banta, H., Burns, A, "Medicare Coverage, Medicare Costs, and Medical Technology," Journal of Health Politics, Policy and Law 10(1), Spring 1985.

Sloan, F., "Lifetime Earnings and Physicians' Choice of Specialty," Industrial and Labor Relations Review 24:49, 1970.

Social Security Administration, Office of the Actuary, "Actuary Study No. 85," July 1981.

- Stamper, R., Colenbrander, A., and Haugen, J., "Intraocular Lens Data," Ophthalmology Instrument and Book Supplement, pgs. 164-180, 1984.
- Stark, W., Terry, A., and Worthen, D., et al., "Update of Intraocular Lenses Implanted in the United States," American Journal of Ophthalmology 90(2):238-239, 1984.
- Stark, W., Telephone conversation, July 1985.
- Swinger, C.A., Barraquer, J.I., "Keratophakia and Keratomileusis: Clinical Results," Ophthalmology, 88:709-715, 1981.
- Taylor, J., "Medicare Payments and Changes in the Rate of Cataract Extraction," Ophthalmology 88(1):41A-43A, January 1981.
- Terry, A., "Cataract Surgery in the 1980's," submitted to the American Academy of Ophthalmology, January 1985.
- United States Congress, Senate, Special Committee on Aging, "Unnecessary Surgery: Double Jeopardy for Older Americans?" Briefing Paper, March 13, 1985.
- U.S. Department of Health and Human Services, Public Health Service, Office of the Assistant Secretary for Health, National Center for Health Services Research, Health Technology Assessment Series: Health Technology Assessment Report, 1984, No. 21, Nd: YAG Laser for Posterior Capsulotomies (Rockville, MD), 1984.
- Wennberg, J., "Dealing with Medical Practice Variations: A Proposal for Action," Health Affairs, pp. 6-32, Summer 1984.
- Wills, J., Garrison, L., and Peterson, M., "Manpower Requirements in Ophthalmology," Ophthalmology 88(11):37A-42A, November 1981.
- Yett, D., Der, W., Ernst, R., et al., "Physician Pricing and Health Insurance Reimbursement," Health Care Financing Review 5(2):69-80, Winter 1983.

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Ophthalmologist
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Walter Stark, M.D.
Johns Hopkins University

Barry Stealy
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APPENDIX B - ACRONYMS AND GLOSSARY OF TERMS

AAO -- American Academy of Ophthalmology
AMA -- American Medical Association
AMS -- Applied Management Sciences
ASC -- Ambulatory Surgical Center
BHP -- Bureau of Health Professions
CBO -- Congressional Budget Office
CPR -- Customary, Prevailing, and Reasonable
DRG -- Diagnosis-Related Group
ECCE -- Extracapsular Cataract Extraction
FDA -- Food and Drug Administration
FR -- Federal Register
FTE -- Full Time Equivalent
GMENAC -- Graduate Medical Education National Advisory Committee
HCFA -- Health Care Financing Administration
HDS -- Hospital Discharge Survey
HRS -- Hospital Record Survey
ICCE -- Intracapsular Cataract Extraction
IOL -- Intraocular Lens
LOS -- Length-of-Stay
NCHS -- National Center for Health Statistics
OR -- Operating Room
OTA -- Office of Technology Assessment
PPS -- Prospective Payment System
PRO -- Peer Review Organization
ProPAC -- Prospective Payment Assessment Commission
YAG -- Yttrium-Aluminum-Garnet

Aphakia -- The absence of the lens of the eye
Cataract -- Opacification of the lens or its capsule sufficient to interfere with vision
Extracapsular cataract extraction -- Removal of cataractous lens of eye from the capsule hold it -- part or all of capsule is left intact in the eye
Intracapsular cataract extraction -- Simultaneous removal of cataractous lens of eye and the capsule that holds it in place
Intraocular lens -- A lens implanted in the eye to replace the natural lens removed during cataract surgery