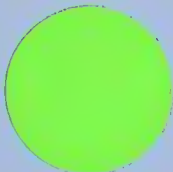


# Working Paper Series



*No. 84-4*

## **Alternative Methods for Describing Physician Services Performed and Billed**

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Health Care Financing Administration  
Office of Research and Demonstrations

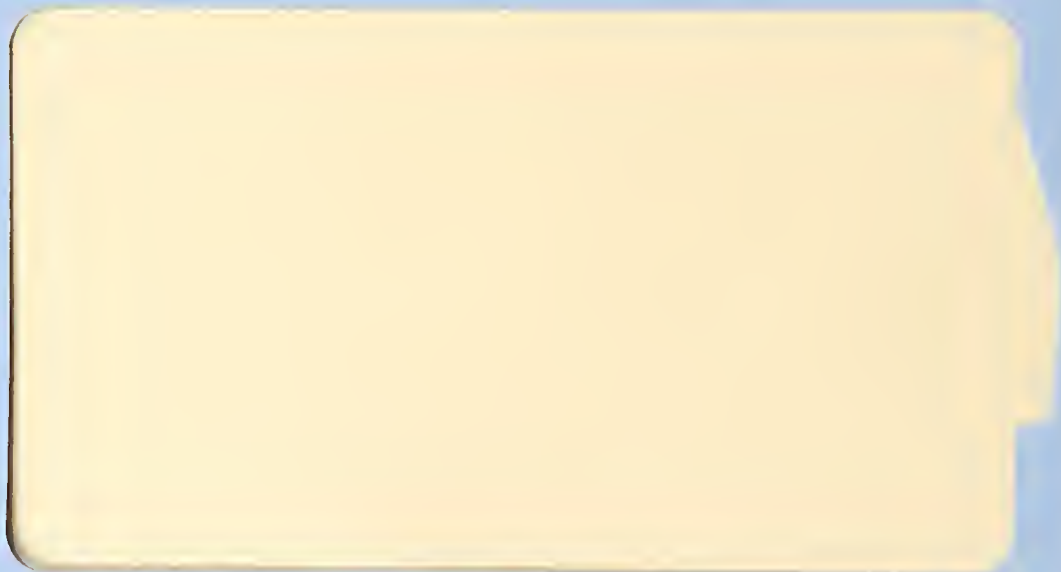
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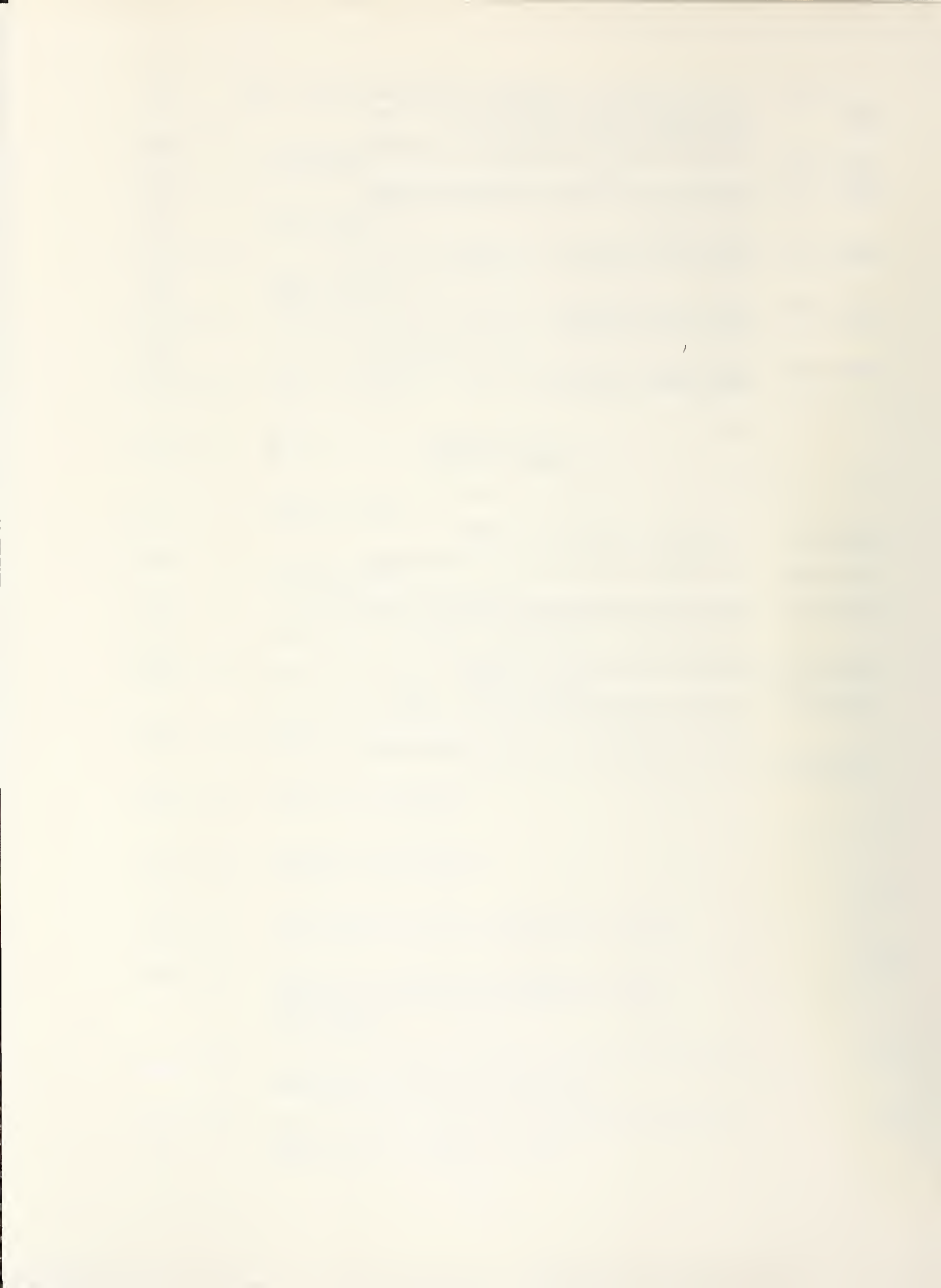
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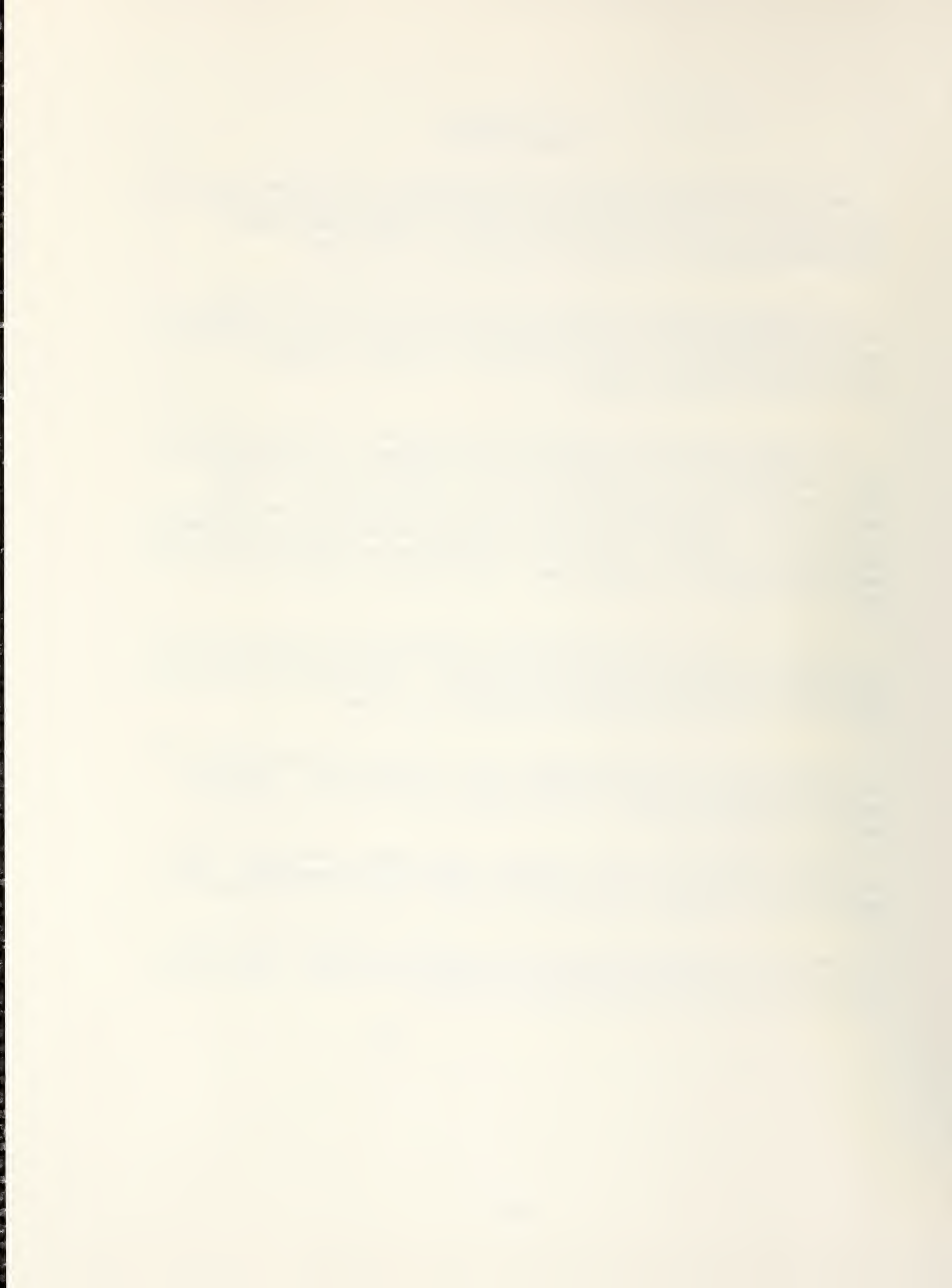
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JBM





## ABSTRACT

To date, Federal efforts to control physician expenditure inflation have focussed primarily on either restraining fee increases or reducing unnecessary utilization. Effective cost control, however, can only be achieved by controlling price and quantity simultaneously, and this requires an innovative approach to reimbursing physicians. We have explored new ways of "packaging" physician services, approaches that re-define the payment unit from a narrow procedure to a more comprehensive bundle of services.

Using 1981 Medicare Part B claims from Michigan and South Carolina, we simulated what these packages might look like. The absence of good casemix measures would appear to render ambulatory care packages infeasible, at least at the present time. These include office visit packages (in which routine ancillary services are packaged with the visit itself) and ambulatory condition packages involving a fixed payment per quarter for, say, diabetes-related care. Both ambulatory packages exhibited tremendous variation in physician charges (with C.V.s exceeding 100%), implying considerable differences in casemix severity. Other potential problems include higher revisit rates and extra billing for out-of-condition care.

Two other types of packages definitely seem feasible and appropriate for further study by HCFA, however: the special procedure package and the inpatient condition package (also known as physician DRGs). A special procedure package consists of all related components of a diagnostic or therapeutic procedure, including the services of all involved physicians. Procedures suitable for this packaging arrangement include all surgical operations, major diagnostic procedures such as endoscopies, and complex radiological procedures (e.g., cardiac radioisotope scan). For a cholecystectomy, for example, services provided by a surgeon, assistant surgeon, anesthesiologist, and radiologist (for operative x-rays) would be part of a single package. An inpatient condition package is even broader in scope, encompassing all physician services provided during the hospital stay. DRG-like methods could be used in combining claims of multiple physicians and averaging charges over the hospitalization to arrive at a single payment. These packages have been referred to as "physician DRGs."

The major advantage to both special procedure and inpatient condition packages is that they encourage the physician to take a broader view of the patient care process, with incentives to cut back on marginal procedures. The package physician (primary surgeon or attending physician) would no longer be able to treat complementary physician services as free goods. These packages are also less intrusive in that responsibility for monitoring utilization rests with the physician rather than an outside agency.

Despite these advantages, both of these packages exhibited substantial unexplained within-procedure and within-DRG variation in total physician charges. We do not know whether this variation reflects differences in severity (not captured by the DRG) or idiosyncratic differences in treatment patterns; the source of variation obviously has important implications for physician equity. In addition, we do not know how physicians will actually respond when faced with a fixed package payment; will they cut back just on those procedures with low marginal value, or will they skimp on truly necessary services? We recommend that HCFA implement a demonstration project to test the efficiency, equity, and access impacts of these packages.



## 1.0 EXECUTIVE SUMMARY

### 1.1 Sources of Physician Expenditure Inflation

The rapid escalation in physicians' services expenditures in the last 15 years no longer needs documentation. In 1965, the U.S. spent \$8.5 billion on physician services alone; by 1982, this number increased more than seven-fold to \$61.8 billion (Gibson, et al., 1983). This represents a compound rate of growth of 11.7 percent. The federal share of this outlay has been growing as well, from 15 percent of physician expenditures in 1970 to 22 percent in 1982. One out of every five dollars spent on physicians' services is being spent by the federal government through Medicare and Medicaid.

Of course, part of this increase can be attributed to population growth and inflation in the economy as a whole. These factors account for only two-thirds of the growth in physician expenditures over the last decade, however (Freeland and Schendler, 1983). Part of the additional dollars were accounted for by physician fee increases, above and beyond general price inflation. Even so, over one-quarter of the growth in expenditures (27.4%) remains "unexplained", but is usually ascribed to service intensity, e.g., more surgeries per hospital stay, more lab tests, longer visits, etc. (Although real gains in utilization have been made for the poor and elderly in the last decade, visits per capita have increased only modestly.)

A related reason for this escalation is attributable to procedure inflation and unpackaging of Medicare and Medicaid services. Examples of unpackaging (also known as a la carte billing) include charging separately for post-operative visits instead of including them with the fee for the surgery itself, or charging separately for each lab test rather than including them in a global office visit fee. Why do physicians unpackage their services? Some state boldly that it's the only way to beat low government fee schedules, while others claim that insurers, particularly Medicare, insist on receiving an itemized bill (see Kirchner, 1979). Whatever the reasons, the net impact appears to be a substantial increase in total physician charges.

Procedure inflation is the practice of billing under a more complex (i.e., more expensive) procedure code for the same service. This practice may be particularly widespread among medical services, where the distinction between brief, limited, and intermediate office visits, for example, is ill-defined, resulting in higher outlays by insurers (Holahan and Scanlon, 1978; Sobaski, 1975.)

To date, federal efforts to control physician expenditure inflation have focussed primarily on restraining physician fee increases (e.g., the Medicare Economic Index) and to a lesser extent on reducing unnecessary services (through the PSRO program, for example). Neither of these approaches, however, can effectively curb unpackaging or procedure inflation. If anything, they will exacerbate them, as was the experience during wage and price controls imposed under the Economic Stabilization Program in effect from 1971 to 1974 (Holahan and Scanlon, 1978). But if traditional approaches to physician expenditure control will not solve these problems, what will? To answer this question, we need to consider some mundane issues of program implementation and management, specifically the medical procedure terminologies.

Medical procedure terminologies are the coding systems that serve as communication between physicians and third party payors. The terminology is intended to help the physician describe the medical service(s) provided, and the numerical code assigned to each term expedites reporting and claims processing. The procedural detail (number of codes) in these systems has multiplied several-fold. Consider, for example, the Current Procedural Terminology (CPT) developed by the American Medical Association (AMA) and recently adopted for use in a modified form by the Medicare program. The AMA published its first edition of CPT in 1966, containing 2,084 separate procedure codes for medicine, surgery, anesthesia, radiology, and pathology. By 1977, the fourth edition (CPT-4) contained 6,132 codes, a three-fold increase since its first publication eleven years earlier. One of the major reasons for this increase has been the rapid growth in medical knowledge and technology. As new procedures have been developed, new codes are required for reporting and reimbursing those procedures. Regardless of its etiology, however, this procedural detail may facilitate expenditure inflation in the following ways.

First, with a greater number of procedures to choose from, the physician has more latitude in billing under a more complex, costly procedure code for the same service. If only one category existed for office visits, physicians could only bill under its code number, receiving a fixed reimbursement per visit. When the carrier allows for two or more codes, however, supposedly varying in complexity as well as payment (e.g., brief vs. intermediate office visits), the physician may have an incentive to "upgrade" his visits in nominal (name-only) terms to the more lucrative code. The more numerous the codes for any activity, the easier it is to subjectively rename a "brief"

visit, "intermediate," and an "intermediate" visit, "extended." Upgrading services for billing purposes without altering their content we call nominal procedure inflation (procinflation).

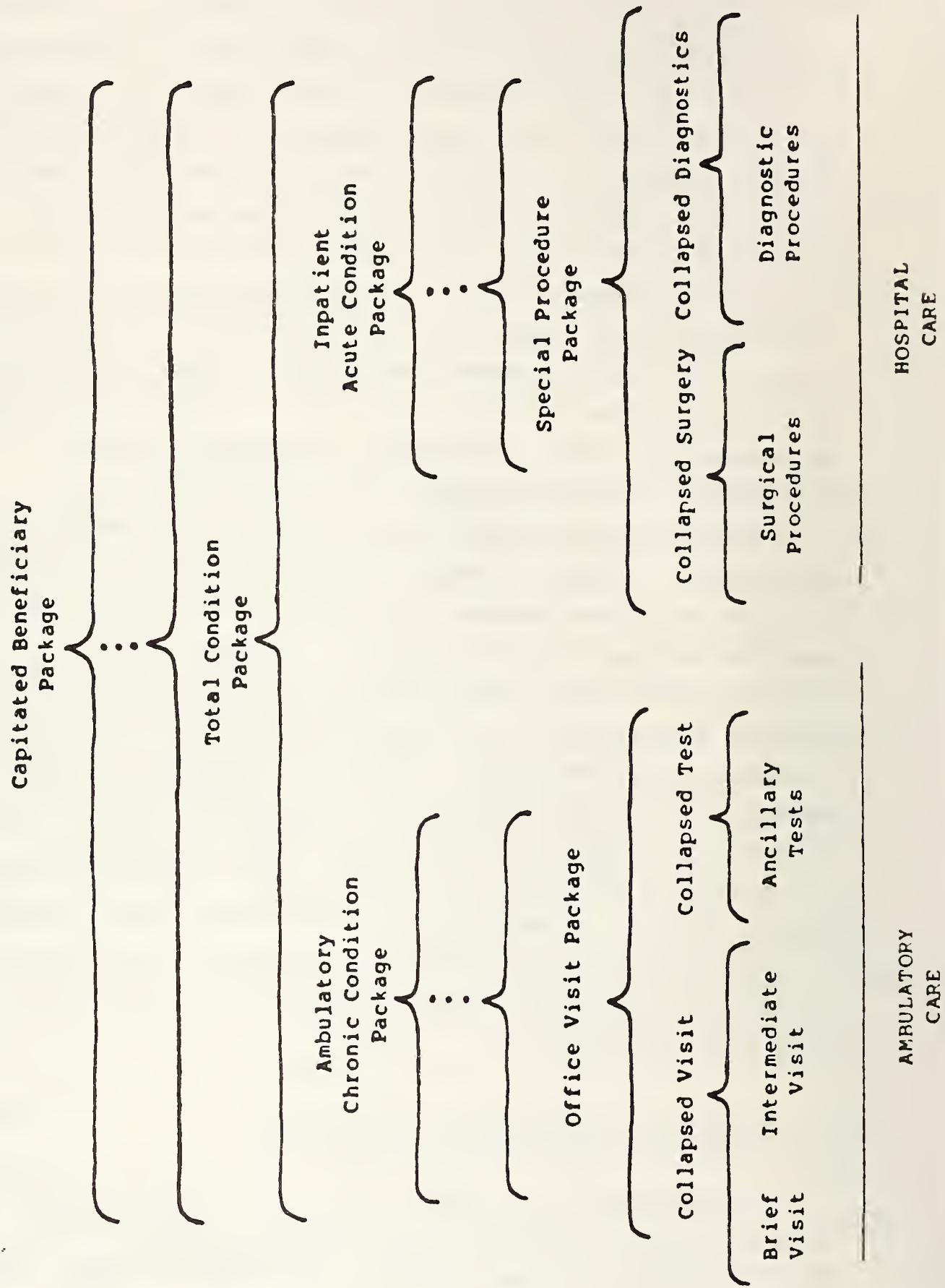
The second way in which procedure terminologies may fuel inflation is through the unbundling that goes hand-in-hand with the extra procedures. Lab tests are a good example. Newer medical terminologies encourage (if not require) physicians to list lab services separately from the physician component of the visit. Medicare, Blue Shield, and other insurers using UCR reimbursement methods screen and pay for visits and lab tests as if they were medically unrelated. Prior to the unpackaging of tests, the visit payment covered both components: that is, the physician time with the patient plus the total charge for lab tests. The principal effect of billing for tests separately is that no automatic constraint is placed on the frequency, or rate, of lab testing or of any other studies. Medicare and other insurers focus entirely on price, not quantity, encouraging physicians to "make up" for fee reductions through unbundling with intensification.

Under this HCFA project, we have explored ways of dealing with the problem more directly through alternative reimbursement "packages", including physician DRGs. These packages were tested using 1981 Medicare Part B claims data from Michigan and South Carolina. If coding systems can be modified, either prospectively by changing the terminology or retrospectively by combining separate bills, considerable savings in the Medicare Part B program could be achieved every year. Packages are proposed and analyzed that basically encourage the physician to take a broader view of the patient care process, with incentives to cut back on marginal procedures. If successful, they would be a significant improvement over fee regulation alone, for they address "quantity" as well as price. Furthermore, they are less intrusive in the sense that physicians themselves are encouraged to monitor utilization instead of an independent, impersonal review organization run by the medical society or the carrier.

## 1.2 Alternative Reimbursement Methods (ARMs)

Using criteria that included unit of payment, scope of services, and several others, a limited set of seven basic packages have been developed that serve as archetypes for more specific, operational packages. Figure 1-1 displays the set in hierarchical order, according to their scope of included services. As one moves up the pyramid, more and more services are packaged

FIGURE 1-1: HIERARCHY OF PHYSICIAN PACKAGES



and paid for under a single fee.

- (1) Collapsed, or recombined, Procedure Packages (CPPs) form the lowest level. They would take selected generic procedures like medical office visits, radiological x-rays of the chest, and the like and collapse them by reducing the number of sub-codes. This is shown in Figure 1-1 by the merging of "brief" and "intermediate" office visits into one category, as one example. All medical (office and hospital visits), surgical and radiologic procedures would be candidates for recombining (although not across office and hospital settings).
- (2) Office Visit Packages (OVPs) form a second-tiered cumulation of office visits and associated ancillaries into a single line item on a claim. The office visit itself would be the unique payment unit with some casemix distinction likely, such as visit type (new or established patient), diagnosis (e.g., cancer), Ambulatory Visit Group (an ambulatory analog to DRGs), Reason For Visit, or patient demographics, such as age. Multiple providers (radiologists, pathologists, independent labs, etc.) would be combined into one bill and precluded from billing separately. Inpatient activity would be excluded.
- (3) Special diagnostic or therapeutic Procedure Packages (SPPs), as an analog to office visit packages, would include both technical and interpretive components of a special procedure with no distinction as to number of views, done at rest or in motion, etc. For a cardiac radioisotope scan, for example, services rendered by both cardiologists and radiologists would be part of a single package. Therapeutic procedures like surgery with anesthesia, assistant surgeons, and related x-rays would be packaged in the same manner. The unit of payment would be the primary functional procedure (e.g., a scan or operation). Any included ancillaries would be complementary only to the main procedure, which is a more narrow scope than for the diagnosis and treatment of a patient's condition. Usually no casemix adjustment would be necessary due to the specificity of the procedure.
- (4) Ambulatory Condition Packages (ACPs) constitute the first real break with the procedure as the unit of payment. What distinguishes them from diagnosis-based office visit packages would be the extended time interval. For chronic conditions treated in an OPD, clinic, or office, a fixed interval would be established (e.g., diabetes management for three months), and the physician would be responsible for all ambulatory care for the condition during the period.
- (5) Inpatient Condition Packages (ICPs) involves acute, hospitalized cases with an open-ended, but finite, length of stay. DRG-like methods could be used in combining claims for many physicians and averaging charges over the hospitalization to arrive at an average payment. These packages have been referred to as "physician DRGs".

- (6) Total Condition Packages (TCPs) would go a step further and lump both inpatient and outpatient physician care together, but still only for a given medical problem.
- (7) Capitated Beneficiary Packages (CBPs) are the broadest of all and would be based on the beneficiary as the unit of payment (e.g., the Medicare or Medicaid eligible). In this "package of condition packages," the physician would take responsibility for some or all of the patient's medical care for a fixed time interval, with or without any casemix adjustment. The physician may take responsibility only for the services he usually provides such as visits, simple lab tests, and surgery if required, or the package could extend to all ancillaries and inpatient care, as with case manager schemes. Under the all-inclusive package without any casemix adjustment, complete capitation is achieved with the physician at risk for all utilization, if any. Casemix distinctions could be made based on patient demographics like age or eligibility (Aged vs. Disabled under Medicare, AFDC, Disabled, Medically Needy under Medicaid) to reduce physician risk. The package would obviously be prospective.

No analysis of Total Condition or Capitated Beneficiary Packages appears below, as on-going HCFA demonstrations should cover them more fully than we could. We do discuss their potential strengths and weaknesses, however.

### 1.3 Advantages and Disadvantages to Different Packages

Any deviation from current reimbursement practices will result in some change in physician behavior. How do we decide whether the change is for the good? A set of criteria is needed for this purpose, which we have developed in five broad areas:

- efficiency (both in physicians' practices and systemwide);
- equity (to physicians and beneficiaries);
- advisability (physician and beneficiary acceptance);
- feasibility (carrier implementation; data availability for payment determination); and
- patient health (including continuity of care).

Table 1-1 lists the major advantages and disadvantages to the seven approaches to packaging physician services. (The three condition packages have been summarized as a group.)



TABLE 1-1

ADVANTAGES AND DISADVANTAGES TO PACKAGING PHYSICIAN PAYMENT

ADVANTAGES	DISADVANTAGES
<u>COLLAPSED PROCEDURES PACKAGES</u>	
<p>Reduces paperwork                      Less proinflation                      Retains illness-specific billing                      Highly feasible to construct                      Abuse surveillance maintained                      Minimum resource skimping                      Equitable to specialists</p>	<p>Fails to control unbundling                      Less assignment on high cost procedures</p>
<u>OFFICE VISIT PACKAGES</u>	
<p>Less ancillary unbundling                      Encourages price bargaining with ancillary providers                      Reduces paperwork</p>	<p>Encourages revisits                      Resistance by ancillary providers                      Difficulty in classifying patients by severity                      Skimping on necessary testing                      Less assignment for ambulatory care</p>
<u>SPECIAL PROCEDURE PACKAGES</u>	
<p>Fewer unnecessary surgical assists and consultations                      Encourages fee bargaining                      Reduced multiple billing                      Less hospital use</p>	<p>Resistance by hospital-based physicians                      Requires new procedure screens                      Skimping on technical support                      Less assignment of surgery, special tests</p>
<u>CONDITION PACKAGES</u>	
<p>Less unbundling and revisits                      Eliminates proinflation                      Reduces paperwork                      Eliminates procedure-specific profiles                      Makes primary physician a gatekeeper                      Encourages integrated patient care</p>	<p>Encourages caseinflation                      Encourages "out-of-condition" billing                      Skimping on visits, testing                      Inequities for severe cases                      Cream-skimming within condition                      Resistance by specialists                      Encourages admissions (if payment DRG-based)</p>
<u>BENEFICIARY PACKAGES</u>	
<p>Less unnecessary inpatient use and surgery                      Less unbundling, revisits, and readmissions                      More preventive care                      Eliminates proinflation, caseinflation                      Primary physician a gatekeeper                      Encourages integrated care                      Reduces paperwork</p>	<p>Less physician input and access                      Skimping on resources                      Inequities for severe cases                      Resistance by specialists                      Complicated implementation                      Cream-skimming</p>

### 1.3.1 Collapsed Packages

By simply reducing the absolute number of procedure codes, collapsed packaging can greatly reduce the number of codes physicians and third party payers must keep track of. This should constrain procinflation as well, as distinctions between codes become clearer and more amenable to verification. Further, in retaining procedure billing, collapsed packages would permit physicians to tailor bills to the medical needs of individual patients, thereby discouraging resource skimping. It would also be equitable to specialists who could continue to charge more for complicated procedures.

Nevertheless, collapsed packages fail to address the biggest problem: unbundling with intensification. They would also discourage physicians from accepting the Medicare rate as payment-in-full (i.e., taking assignment) on the higher cost procedures that may have been collapsed into a broader procedure code.

In our empirical work, we found that most of the fractionated billing under CPT-4 is a result of excessive, nested strata reflecting degree of procedure difficulty and performance of complementary subprocedures. One example is a diagnostic colonoscopy which has 12 CPT-4 codes based on a six-cell stratification of sub-procedures (e.g., biopsy) by whether or not the procedure went beyond the splenic flexure. While such detail precisely defines what the physician has done, maintaining 12 separate procedure profiles on a \$300-400 procedure performed in a very small number of patient contacts certainly raises program administrative costs. As another example, actual reported charges do not support the notion that a comprehensive visit for a new patient is any different than that for an established one. Hence, 11 CPT-4 office visit codes, some of which show very low frequencies, could be collapsed into just three for payment purposes: (1) minimal, brief, limited; (2) intermediate and extended; and (3) comprehensive. Procinflation would be further limited by clear definitions of the three codes.

Moreover, nested procedure profiles often lead to important deviations from marginal cost pricing rules (e.g., biopsies costing many times more when done as part of a more complicated colonoscopy). They also occasionally allow for higher reimbursement of outmoded or inefficient technologies (e.g., rigid bronchoscopes). Limiting payment to the lower of the two costs of competing technologies seems appropriate -- barring outcome differences.

Proving procinflation under highly fractionated billing is extremely difficult. We do find, however, that GPs sometimes are being paid as much as medical specialists for a given type of visit, not in total but per hour with the patient. While their valued marginal product could be the same as a specialist's for the same type of visit, equal rates per hour could also be indicative of procinflation on the GPs' part, e.g., calling a 10 minute brief visit an intermediate one. Reducing the number of codes and more clearly specifying content differences could be very cost effective.

### 1.3.2 Office Visit Packages

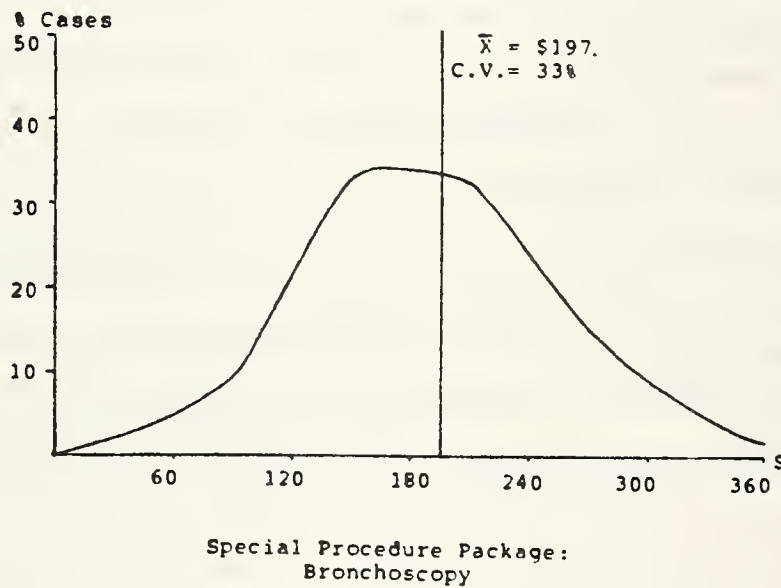
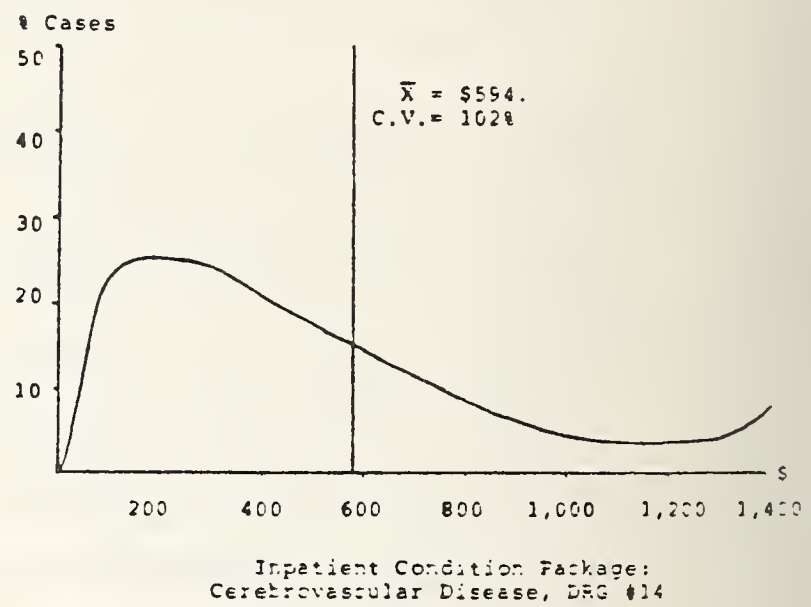
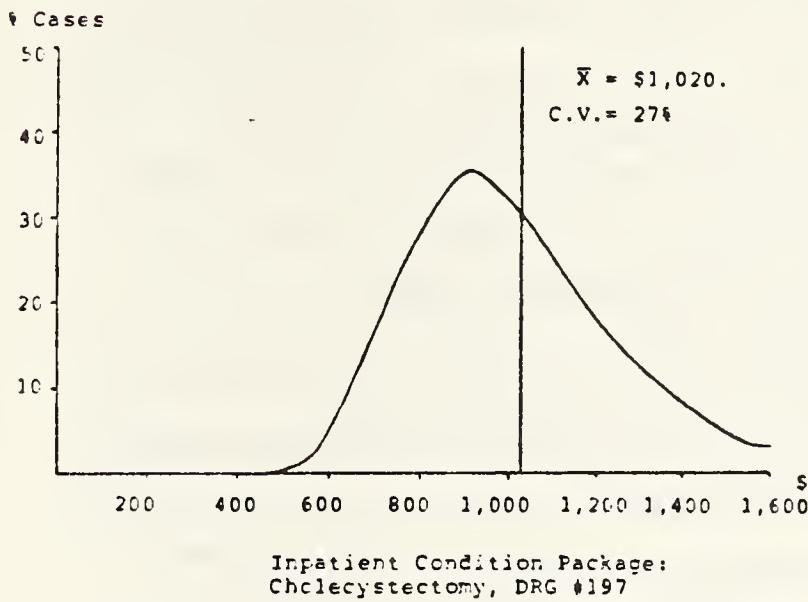
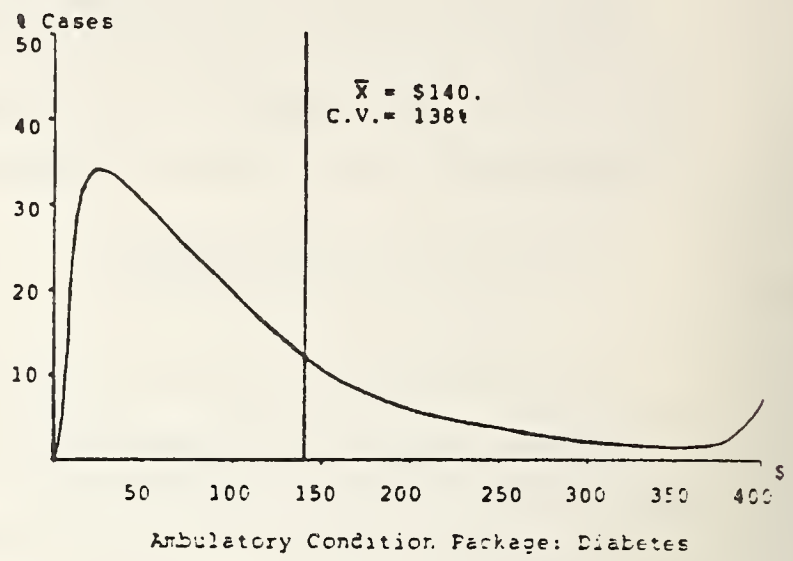
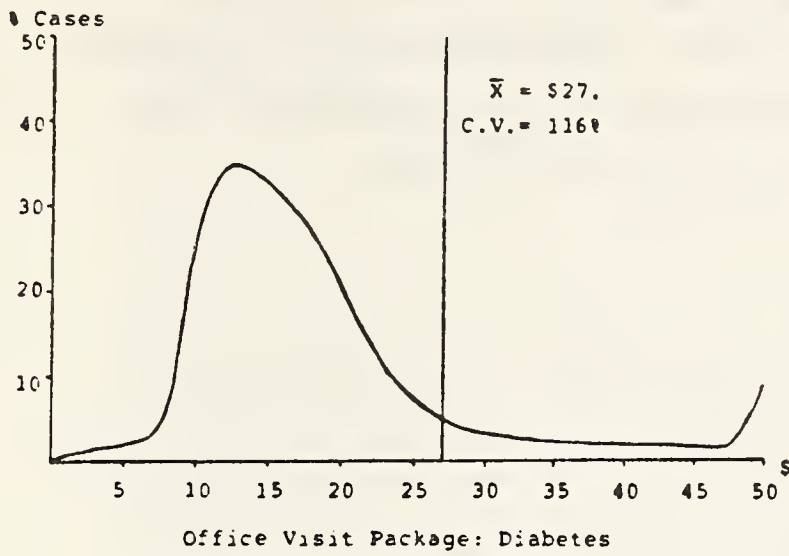
Folding in ancillary lab tests, x-rays, and ECGs with office visits to produce a single office visit package would not only reduce the paperwork of listing each test separately but should discourage unbundling. It should also encourage physicians to shop around for the best price on ancillaries, an incentive largely absent from the current system.

An immediate concern with going to a visit-cum-ancillary package would be the revisit rate. Physicians would have a clear incentive to increase patient contacts for any illness, spreading a fixed amount of testing over more visits to increase total reimbursement. Changes in billing regulations would also have to be made, preventing labs and other ancillary providers from billing separately for tests recommended as part of ambulatory physician care.

Another implementation problem would involve developing meaningful visit categories for packaging ancillaries. The current Medicare CPT-4 terminology has 11 visit types, stratified by complexity and new vs. established patient. Significant within-visit variation in ancillary testing due to severity would lead to inequitable payments to physicians and, possibly, some skimping on ancillaries as a whole. How best to classify patients for ambulatory reimbursement would be one of the most difficult tasks in setting up packages.

An obvious casemix adjustor is diagnosis. Even within narrowly defined diagnostic strata such as hypertension and diabetes, however, we observed tremendous variation in price, with coefficients of variation (C.V.s) ranging from 115 to 150 percent. (See Figure 1-2.) Only a small percent of the intra-diagnosis variation (less than 5%) could be attributed to the specialty of the physician treating the patient, geographic location, or to patient characteristics. Most of the variation in package price was due to the number and type of ancillary services provided during the office visit, especially lab tests.

FIGURE 1-2. SIZE DISTRIBUTION OF TOTAL PACKAGE COSTS



In order to determine whether other casemix adjustors might produce more homogeneous office visit packages, we compared diagnosis with two other methods, using National Ambulatory Medical Care Survey data: reason for visit, and Ambulatory Patient Group, an office visit analog to hospital DRGs. None of these approaches, however, proved superior in their ability to minimize within-package variation. Better measures of ambulatory casemix may be needed before office visit packages will be acceptable to physicians.

### 1.3.3 Special Procedure Packages

Precedent exists for this approach, as surgeons' inpatient services are already packaged, and Medicare does not pay any additional bills for their pre- and post-operative visits in the hospital. Still, the special procedure package would go a step further by requiring the physician performing the procedure to submit a single bill that included other related physician services as well, e.g., the anesthesiologist, the assistant surgeon, and the radiologist. This approach could also be extended to diagnostic procedures, like endoscopies, which remain highly fractionated. Currently Medicare allows physicians to bill separately for actual performance of the procedure and for the consultation with the patient.

Fewer unnecessary assistant surgeon bills and x-rays are a logical advantage to such a package, as well as providing some encouragement to fee bargaining. Diagnostic procedure packages would also discourage any redundant billing for office and hospital visits. If other hospital services such as operating room costs, lab tests, and routine nursing care were also included, the package would have profound implications for hospital costs generally. Nor is the idea as far-fetched as it sounds. The DRG prospective payment system, newly enacted by Congress, explicitly mandates HCFA to begin to collect data to calculate physicians' charges for each DRG, some of which are based on special procedures. While its intent is to tie physician charges to DRGs in some fashion, it is not yet clear how this would be done. Given the significant variation in treatment patterns within many DRGs, as discussed below, a procedure-based package may be more equitable and feasible on balance.

Hospital-based physicians will strongly resist special procedure packages, particularly if they could no longer bill Medicare independently. Even the billing physician will be lukewarm to this package at best because of the added hassle of "negotiating" with assistants and specialists. This could

lead to skimping on technical support services and lower assignment rates for these costly procedures.

Regarding surgical procedure packages, the claims data show quite limited price variation in most cases, e.g., coefficients of variation less than 20 percent, implying that a single payment might be equitable. Surgeons doing simple operations like hernia repairs apparently still employ assistant surgeons 5-10 percent of the time, so a package lumping the surgeon's and assistant surgeon's bills could eventually save Medicare a fair amount on total surgical reimbursement -- presumably with no effect on outcomes. Notable exceptions would have to be made for two of the procedure-based DRGs we examined: major hip surgery and lens extractions. Both show dramatic variation in physician costs by complexity of surgery, which could introduce real payment inequities.

Analysis of diagnostic procedure packages showed much more price variation, due to the relative importance of complementary subprocedures such as biopsies. What is particularly interesting is the variation in the likelihood of a separate visit charge accompanying the procedure fee. General surgeons rarely charge for a visit while other physicians do so about half the time. This phenomenon has two implications for packaging. First, capping visit and procedure fees separately could result in a rapid increase in additional visit bills given the amount of potentially latent billing involved. Second, packaging a visit fee with the diagnostic procedure would accomplish a dual purpose of constraining both price and quantity as well as improving system equity for those physicians not currently charging for a visit.

Finally, some diagnostic procedures like upper GI endoscopies appear to be much cheaper on an ambulatory basis because of far fewer associated lab tests and x-rays. Again, it may not be enough to set a common price for the procedure alone across specialty or locus of service if most of the true price variation is the result of complementary ancillaries.

#### 1.3.4 Ambulatory, Inpatient, and Total Condition Packages

Condition packages are like office visit packages that use diagnostic casemix stratifiers, but fundamentally differ in covering services over a specified period of time. They also share things in common with special procedure packages, except that payment is not tied to a specific procedure, but to an illness. Because the package includes all physician services related to the condition, the "package" physician would necessarily fulfill a

gatekeeper's role. Procinflation would be abolished, as the unit of payment and mode of treatment would be separated; that is, procedures would be irrelevant to payment.

Like office visit packages, condition packages would discourage unbundling, but they would go another step in discouraging revisits as well (at least for ambulatory care). Consider a three-month ambulatory condition package for hypertension, for example. The physician would have an incentive not only to reduce the number of lab tests, x-rays, and other ancillaries he performed (accounting for two-thirds of the total package price), but he also would cut back on his own visits as well as referrals to other physicians. Condition packages would also greatly streamline billing by eliminating procedure reporting and reducing the number of claims submitted. As many as ten different physicians may be involved during an inpatient stay, each of whom now bills independently: the surgeon, anesthesiologist, assistant surgeon, radiologist, pathologist, a variety of consulting specialists, as well as the patient's personal family physician. Under a physician DRG package, only a single bill would be submitted and a single payment made.

The Achilles' heel of all condition packages is the manner in which the "case" is defined. All the gains to this package depend on its integrity. If the range of services cannot be well specified in advance, or if the final set excludes care received in other locations (e.g., hospitals), then physicians have strong incentives to (a) take the condition's periodic payment as a base and bill for as many services as possible "out-of-condition," (b) increase referrals, or (c) to casinflate by "upgrading" the severity of the patient's illness to receive higher reimbursement.

Casinflation, procinflation, DRG creep, and cream-skimming are all manifestations of this definitional ambiguity, plaguing any system that attempts to categorize patients or services for the purpose of reimbursement. Furthermore, for DRG-based Inpatient Condition Packages, strong incentives to readmit exist because payment is based on the admission and not completely on the condition.

Out-of-package care is, in fact, a major problem in Ambulatory Condition Packages. Almost two-thirds of the services provided under both the hypertension and diabetes packages were for a diagnosis other than the one used to define the package. This is not surprising, given the multiple chronic conditions of many elderly. The package physician, however, was responsible not only for all of the in-package services but for half of the out-of-package care as well, billing for about two-thirds of all charges

during the package period. This suggests that packaging total ambulatory patient care for a specified time period might be more feasible than a condition-specific package.

Unlike ambulatory conditions, inpatient conditions may lend themselves much more readily to packaging. The payment unit (i.e., period of hospitalization), for example, is easily and objectively defined. This type of package has also been called a "physician DRG". Although average package prices varied across DRGs as expected (e.g., cases with complicating conditions cost more than those without), there remained almost as much variation within each DRG package as there was for all cases combined. This appeared to be largely due to the tremendous variation in the number and type of physician services involved during the hospital stay. Take surgical DRGs like those for cholecystectomy, shown in Figure 1-3, for example: Besides the surgeon and anesthesiologist, there may be an assistant surgeon, radiologist, pathologist, a variety of consulting specialists, as well as the patient's personal family physician providing routine hospital visits. The latter visits, of course, are in addition to the follow-up care that was to be provided by the surgeon who performed the cholecystectomy.

While surgical DRG packages displayed considerable price variation (C.V.s generally averaged 25-40%), they appeared remarkably homogeneous when compared with medical DRG packages (where C.V.s often exceeded 100%). This implies that physicians treating these patients would be either under- or over-paid in nearly every case. Of course if much of this variation in input mix and charges is due to the specialty of the package physician (the surgeon or attending), then specialty-specific payment rates might prove more equitable. In fact, however, the choice of specialty had little impact on total package charges.

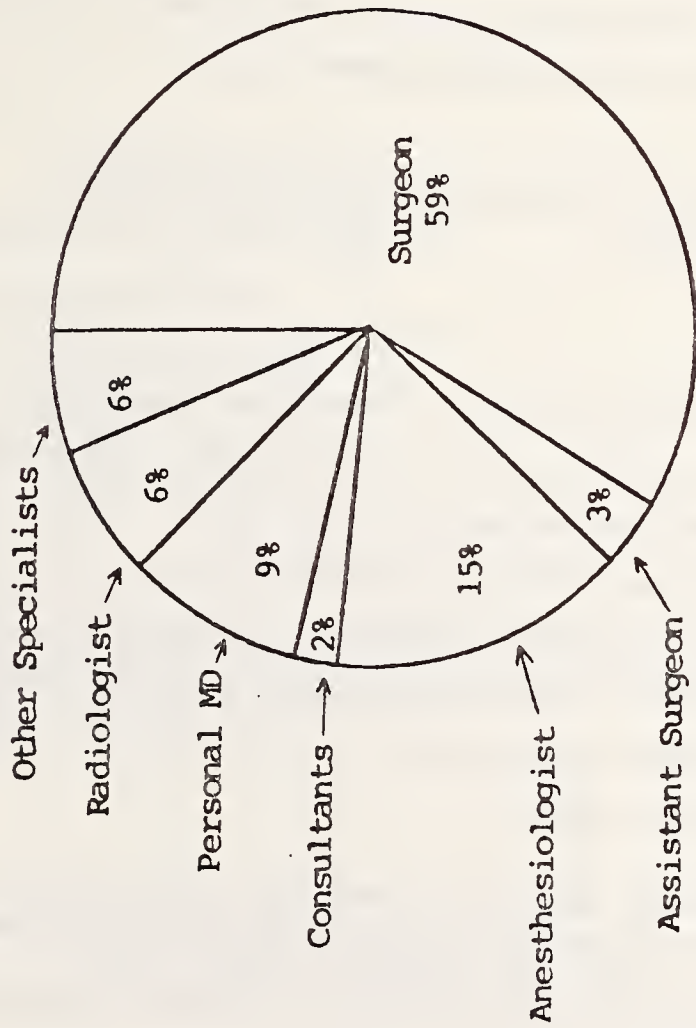
These findings suggest that DRGs as currently defined may not fully capture differences in physician resource use. Comparison with the Medicare DRGs used for hospital reimbursement suggests that hospital and physician inputs may be substitutes, rather than complementary inputs, in the production of inpatient stays. Our data are limited to only a small number of DRGs, however, and more comprehensive research is needed to evaluate the feasibility of physician DRGs.

#### 1.3.5 Capitated Beneficiary Packages

Finally, we come to the fully capitated beneficiary package, a package of condition packages, if you will. Here, the primary care physician is

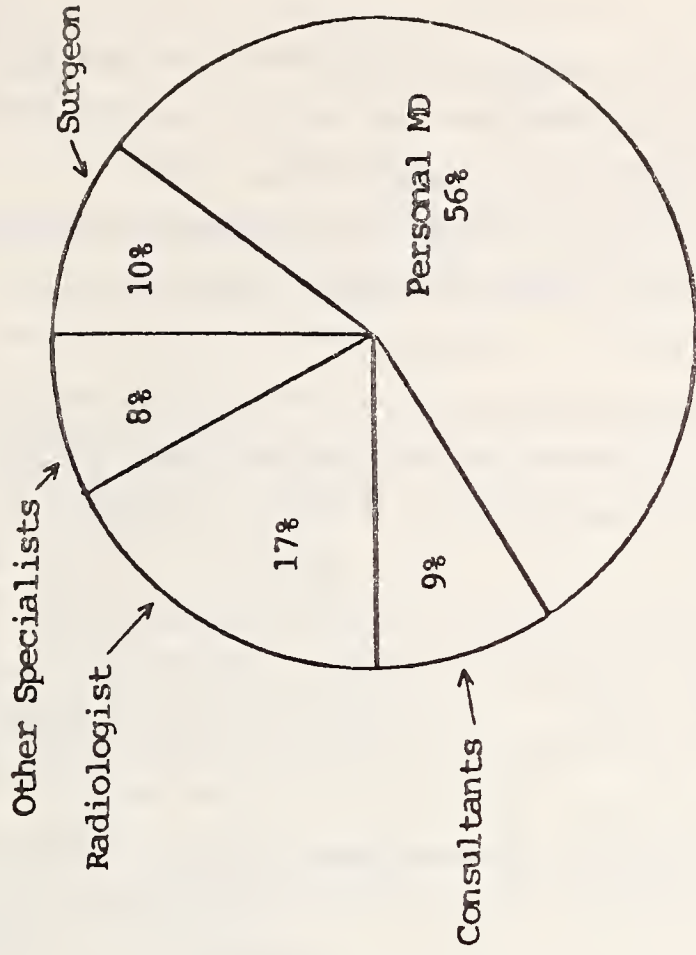


FIGURE 1-3. DISTRIBUTION OF PACKAGE CHARGES BY PHYSICIAN FOR TWO INPATIENT CONDITION PACKAGES



Cholecystectomy

Average Total Physician Charges = \$1,034



Cerebrovascular Disease

Average Total Physician Charges = \$548

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.

obligated to provide all of the patient's medical needs, directly or through referral, regardless of medical problem. For this, the physician is paid a pro rata amount for every beneficiary under his/her care.

Fully capitated packages enjoy all of the advantages associated with condition packages, e.g., less unbundling, fewer revisits, plus they eliminate casinflation, readmissions and the problems with "uncovered" services. They also encourage more preventive care and better continuity as well.

Beneficiary packages also evoke the same concerns as condition packages; namely, resource skimping, cream-skimming, and lack of physician access. Physicians also argue that they prefer being paid when they do something, not when they don't. Another major problem with this approach has to do with specialists. General practitioners are loath to decide when a specialist's services are required, particularly if patients need their authorization first. Failure to adequately monitor specialists has been the downfall of at least one of these kinds of packages (see Moore, et al., 1980, on SAFECO in Seattle). Primary care physicians are also reticent to take on the added risk of being responsible for all of a patient's problems under a fixed rate. Unless ways are devised to pool the risk across physicians and payers, the fully capitated package, without any severity adjustment, will be attractive only to the more entrepreneurial practitioners.

#### 1.4 Distributional Effects of Alternative Packaging Methods

##### On Physician Equity

In most of the packaging approaches we analyzed (special procedure packages usually are an exception), we found tremendous within-package variation, with C.V.s sometimes exceeding 100 percent. Figure 1-2 displays the size distribution of total package costs for five of our packages: office visit, special procedure, ambulatory condition, and surgical inpatient and medical inpatient conditions. Each distribution (except the special procedure package) shows a marked right skew, with the vast majority of cases often costing less than the package mean.

- Physicians managing these low cost cases would enjoy potentially large windfall gains if reimbursed on average package costs. Physicians treating cases in the right-hand tail of the distribution, however, would lose and would lose big.

If losses are due to excessive utilization, then packaging may encourage more efficient use of scarce physician time. If, on the other hand, these cases are more seriously ill, then a package average could introduce substantial inequities -- particularly if casemix severity varied systematically by provider. Can we markedly improve the equity of the packages by using specialty-specific payment rates? Apparently, the answer is no.

- Choice of specialty was found to have little impact on total package charges, either directly through the fees they charged or indirectly through the other physician inputs they ordered.

Any one physician would probably treat both winning and losing cases, so the ultimate policy question centers on how the physician fares overall. For gains and losses to cancel each other out, physicians must have a large enough sample of cases to start with in any period. Yet,

- average physician caseloads were surprisingly low for three of the five DRG packages we examined, as seen in Table 1-2 below.\*

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TABLE 1-2

AVERAGE ANNUAL CASELOADS FOR PHYSICIAN DRGs

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<u>Inpatient Condition (DRG)</u>	<u>Yearly Cases Per Physician</u>
Cholecystectomy	4.6
Transurethral Resection of the Prostate (TURP)	20.6
Cerebrovascular Disease	2.2
Pneumonia	2.7
Lens Procedures	25.5

---

\*Our data represent the universe of all Medicare admissions for each condition in Michigan and South Carolina for an entire year, so sampling can not explain low caseloads.

Small caseloads have important implications for the whole concept of packaging. In particular,

- simple actuarial principles may not work for many conditions nor for many physicians; who wins and who loses may be largely a random event, with inequitable losses and windfall gains.

Lens extractions and TURP packages (two DRGs with high caseloads) are examples where sufficient cases may permit meaningful statistical averages. Even so,

- averaging across cases for each physician still produces large windfall gains and losses.

It is not one or two extraordinarily expensive cases that puts a physician in the red for the year, but rather a systematic pattern of more intensive or higher priced treatment. Interestingly, the sources of loss varied. Some ophthalmologists would lose money on lens extraction packages primarily because of the high fees they charge;

- high surgeons' fees account for over two-thirds of the difference in total package price between winning and losing ophthalmologists.

In sharp contrast,

- there is virtually no difference in the fees charged by winning and losing urologists for performing a TURP. About a third of the potential loss is due to more visits and consultations, a third to other surgery (usually performed by the same urologist), and the remaining third is due to more x-rays and higher anesthesiologist fees.

Unlike their ophthalmologist colleagues who could simply forego their high fees in order to break even on lens packages, losing urologists would have to alter their behavior more drastically, e.g., make fewer referrals, order fewer tests, and refrain from performing other surgical procedures during the TURP admission.

Of course, the averaging principle can work across conditions or procedures as well as within. We would really need to look across many conditions treated by a physician to determine whether a few high cost pneumonia cases, for example, would be offset by a large number of low cost hypertension cases. For this, we would need the universe of all Medicare claims; thus, the ultimate analysis of winners and losers must await future study.

## On Assignment

Where alternative packaging methods have distributional effects on providers, they will impact on assignment rates and patient access as well. It is impossible to predict their effects a priori because no one-to-one correspondence exists between physician winners and losers and current assignment rates. In general we expect losers to have higher charges and therefore be less likely to accept assignment, but some may be losers because of higher ancillary use which has nothing to do with assignment.

Even more important than the absolute number of winners and losers are their Medicare market shares. Physicians now have the ability to selectively refuse assignment on high cost cases. If this option were maintained under packaging, losing physicians would have strong incentives to refuse assignment, effectively negating the positive gains to packaging. Hence, access impacts crucially depend on losers' market shares and previous assignment rates: high shares and/or assignment rates imply more severe access impacts. Preliminary findings are mixed:

- in some packages, potential losers have relatively low market shares and assignment rates; in others, high rates.

Presumably, winning physicians would expand their caseloads somewhat to fill some of the gap, and the net impact on access could be neutral, or even positive.

### 1.5 Recommendations for Policymakers

#### 1.5.1 Which Packages are the Most Promising?

Not all packaging approaches are equally advantageous or feasible to implement; each has its strengths and weaknesses. Which, then, seem the most promising to us? In answering, let us offer a set of points and recommendations on each package.

#### COLLAPSED PROCEDURE PACKAGES

Proliferation of procedure codes has been astonishing since Medicare and Medicaid were enacted -- we now have triple the codes that were used in 1966. While such detail may often provide carriers with valuable information on

exactly what was done, three problems with a highly fractionated billing system argue for some changes:

Problem (1): maintaining separate pricing profiles on several thousand codes by physician by locality within each state adds significantly to program administrative costs;

Problem (2): fine distinctions in codes may sometimes confuse physicians, resulting in two physicians involved in the same surgery billing for different procedures -- with some payment loss to the program; and

Problem (3): multiple codes for the same activity, all priced differently, provide a mechanism (procinflation) for receiving higher payment if the physician feels Medicare reimbursement to be inadequate.

The obvious solution would be

Recommendation (1): Collapse some of the codes in a retrospective fashion for payment purposes, maintaining CPT-4 for billing.

A modified version of CPT-4 is already being implemented and HCFA should not necessarily interfere with this process. Which codes to collapse depends on the severity of the problems listed above, of which we are still reasonably uncertain. Hence:

Recommendation (2): Determine how prevalent and costly procinflation is by conducting a limited impact evaluation of the implementation of CPT-4 and/or earlier conversions in a few states for a small subset of procedures like office visits;

Recommendation (3) Determine the marginal costs of maintaining additional procedure profiles by conducting an administrative cost study of the extra computer, coding, review, and other labor time involved in establishing, screening, and updating selected profiles.

If a procedure-based terminology continues to form the basis of Medicare payment to physicians for some years to come, major program savings could be enjoyed in the short run through the simple expediency of combining codes for payment.

#### OFFICE VISIT PACKAGES

Bundling simple tests and procedures with the office visit into one payment has a definite appeal in that it directly attacks another problem with

a fractionated terminology:

Problem (4): separate payment profiles for each diagnostic test associated with a visit encourages unbundling with intensification where physicians find testing more profitable.

Unfortunately, ancillary procedures cannot be simply grafted onto the current set of CPT-4 visit codes because of the broad range of illnesses they encompass. New visit categories could be generated, but they are subject to a

Potential Flaw (1): no system has been devised that can simultaneously adjust for visit-by-visit differences in ancillary requirements (or severity) and remain outside the physician's or patient's discretion to inflate for reimbursement purposes.

Simple, reasonably fixed, stratifiers like diagnosis explain little of the ancillary differences while more refined approaches like Ambulatory Patient Groups use stratifiers too easily manipulable (e.g., presenting symptoms). Similar criticisms have been made of hospital DRGs, but there, at least, medical records can be checked for a pre-specified list of criteria using established Peer Review Organizations. How similar validation would be done in 300,000 physicians' offices in a cost effective manner is not clear.

The Office Visit Package, to our mind, also has another serious

Potential Flaw (2): physicians could fairly easily increase the revisit rate to offset any losses on earlier visits.

These potential flaws leads us to

Recommendation (4): Reject packaging approaches of this type for physicians' offices (visits to outpatient clinics of hospitals should still be pursued).

#### SPECIAL PROCEDURE PACKAGES

The great advantage of this package is its narrow focus on selected special procedures done in either hospital or outpatient settings. Moreover, it addresses a significant, growing problem:

Problem (5): fractionated billing enables the primary surgeon or attending physician to treat complementary physician inputs as free goods.

As a result, we observe significant, unexplained, variation in the number of different physicians billing for a diagnostic surgical procedure or in the separate billing of a routine visit on the same day. Strong precedent exists for packaging of this type, as surgeons already are prevented from billing separately for follow-up hospital visits in the case of major surgical procedures. Moreover, because anesthesiologists, assistant surgeons, and radiologists clearly play a subordinate role to the head surgeon, payment to a single physician seems justified.

In pursuing this approach, the next step would be

Recommendation (5): Proceed with a demonstration of this package with a few carriers to test the behavioral, cost, and quality impacts.

Ideally, this would not be a strictly voluntary demonstration because of acute selection bias problems: generally, only surgeons who currently are not using other, discretionary, physicians would agree to participate. (A more complete discussion of the kind of demonstration we have in mind is in section 1.5.2 below.)

#### INPATIENT CONDITION PACKAGES OR "PHYSICIAN DRGS"

Extending special procedure packages to all physician care provided during a hospitalization -- popularly referred to as physician DRGs -- implies a fundamental switch from the procedure to the patient (or admission) as the unit of payment. In so doing they address Problem (5) above in an even more comprehensive way, but raise the question of whether the potential gains in cost savings from less fractionated care are justified by the loss of specificity in the illness being diagnosed and treated. The Medicare Prospective Payment System requires that a primary diagnosis be established, a diagnosis that will cover all institutional services provided during a hospitalization. Usually an allowance is made for complications and exceptional cases. Lumping all physician services under one DRG as well may be expedient, but it may also result in grave inequities to physicians treating multiple illnesses in a single admission. On the other hand, inpatient condition packages could exhibit a



Potential Flaw (3): if physicians are not held to a single diagnosis. The ambiguity of determining which services go with which illnesses will inevitably result in extensive billings for "out-of-DRG" care on top of the flat DRG payment.

An obvious suggestion is

Recommendation (6): Whatever admission classification scheme is proposed for packaging inpatient physician care, it should not permit more than one physician payment to be made for an admission, regardless of the number of illnesses treated.

Implementing this recommendation where a patient has two fairly distinct illnesses treated by different physicians will not be easy. At least the hospital receives an actuarially fair payment that covers multiple illnesses and has allocative authority over its resources in treating each problem. The same cannot be said of physicians who may be in different specialties, treating different illnesses coincident in the same patient.

This suggests another

Potential Flaw (4): incorporating physician care in with hospital DRG payment may eliminate any restraint physicians have exercised in discharging and readmitting patients to maximize reimbursement.

Discharging and readmitting patients for a second illness may not only be poorer quality care, it may also be cost-inducing. Moreover, applying penalties to short-duration readmissions may approximate marginal cost pricing rules but be highly inequitable to physicians, if not hospitals.

As for the DRG illness classification method, it is not surprising that any illness classification scheme based on hospital length of stay and ancillary costs will not be directly applicable to physician reimbursement in all cases. This is because hospital and physician services are sometimes complementary, sometimes substitutes, depending on illness. This leads to

Recommendation (7): A more detailed study should be made of the within-DRG variation in severity and physician requirements -- at least for the most expensive DRGs.

Finally there is the additional question, not addressed at all in our study because of limited scope, of cross-DRG equity to physicians. Physicians have very small Medicare caseloads for many inpatient DRGs. This can result

in large random over- or underpayments by DRG. Whether they cancel out across many small-volume DRGs for a given physician is unknown. To the extent most variations do cancel, a stronger defense of DRG payment could be made. Thus, we offer

Recommendation (8): A follow-up study of within vs. across DRG physician inputs should be done using the physician as the unit of analysis.

(HCFA is currently pursuing both recommendations' (7) and (8) with a grant to the Center for Health Economics Research.)

#### AMBULATORY CONDITION PACKAGES

Paying physicians a fixed amount per quarter for, say, a "diabetic" patient has two distinct advantages over Office Visit Packages: (1) they solve the revisit flaw; and (2) they put the physician, not HCFA, at risk for unnecessary care. Nevertheless, they still suffer from another

Potential Flaw (5): physicians have a positive incentive to define as many services as possible "out-of-condition", billing for them in addition to the fixed condition payment.

Comorbid disease is quite prevalent in the elderly, even over short periods. It seems an insurmountable problem of classifying, then reclassifying, millions of enrollees by chronic illness, and finally verifying that classification periodically in the physician's office. HCFA loses either way. Either it permits out-of-condition billing to avoid constant patient reclassification and verification of illness, in which case within-condition payment becomes only a base, or it "negotiates" a fixed classification for a short period with periodic reclassification and its associated costs. Periodic reclassification suggests another

Potential Flaw (6): in the form of a serious discontinuity of care as physicians resist the treatment of real, but unpaid, out-of-condition care or refuse to continue seeing any but the simplest, chronically ill patients.

For these reasons, as well as those already discussed under Office Visit Packages, we make

Recommendation (9): Avoid using any condition stratifier for ambulatory physician care, opting instead for a capitated beneficiary allowance covering any and all ambulatory needs.

#### 1.5.2 Need for Demonstration Project

In all of our statistical analyses, packages have been simulated from secondary claims data, essentially creating them ex post. Thus, it has not been possible to test any changes in physician behavior resulting from packaging. While we have hypothesized how physician responses might affect efficiency, access, etc., we had no way of actually testing those hypotheses. To do so would require a prospective demonstration project. Only through a demonstration can policymakers answer questions such as the following: Do physicians cut back on low marginal benefit services under packaging or do they skimp on truly necessary services? Do increased caseloads of "winning" physicians offset any shortfall caused by "losing" physicians dropping out of the Medicare program?

Given limited resources for demonstration and evaluation, policymakers cannot study all packages and hence must choose the most promising candidates. Which packaging approaches should be the focus of a prospective demonstration? We recommend that HCFA test two approaches of varying comprehensiveness: special procedure packages and inpatient condition packages (physician DRGs). For these packages, the payment unit is easily and objectively defined: the diagnostic or surgical procedure, and the period of hospitalization. By contrast, office visit packages and ambulatory condition packages are much harder to specify, partly because of the lack of an appropriate casemix adjustor and partly because of their heterogeneity. Future development of an ambulatory casemix measure may permit testing these other approaches at a later date.

Ideally, the demonstration project would not be voluntary, as selection bias would seriously jeopardize the validity of the results. Under a voluntary arrangement, presumably only those physicians expecting to make a profit on the packages (i.e., low cost physicians) would agree to participate. HCFA currently has no authority to mandate participation, but there may be ways of encouraging physicians to do so. This can be done indirectly by encouraging beneficiaries to choose physicians participating in the demonstration through reductions or waivers of patient copays for packaged services. Competitive pressures, especially in more physician-dense markets, should induce more physicians to take part in the demonstration.

## 1.6 Implementation Issues

In order to implement and evaluate either the special procedure packages or inpatient condition packages (physician DRGs), policymakers must answer the following four questions:

- (1) Who to pay? -- who will actually receive the package payment?
- (2) What to pay? -- what services will be included in the package?
- (3) How much to pay? -- how will the resultant packages be priced?
- (4) What to do about assignment? -- how does packaging work if assignment remains voluntary?

We discuss each of these issues in detail below.

### 1.6.1 Who to Pay?

Both the special procedure and inpatient condition packages involve packaging the services of (potentially) multiple physicians. Under the current fee-for-service reimbursement system, each physician bills, and is paid, separately for his services. Who would be paid now?

Four variations exist:

- (1) a principal physician is identified (e.g., the primary care physician, the surgeon, the attending physician) who is paid a lump sum for all physician services and then is responsible for any other allocations to physicians;
- (2) the hospital receives a lump-sum payment for both Part A and B services for an inpatient package, then arranges payment to all physicians;
- (3) all physicians (including hospital-based) form a preferred provider organization with an exclusive contract to the hospital and are paid on a capitated package basis; or
- (4) several physicians are paid separately based on a predetermined share of the fixed package amount.

How the fourth method would work, if at all, is unclear. Physicians could submit bills to the carrier up to a specified period after discharge, say, one

month. The carrier could then make payment to each under a pro rata system based on national or regional physician input norms. If the surgeon's national average charge were \$600 for DRG #195, this is what the surgeon would receive, regardless of what he billed. What happens to assistant surgeons or other inputs that are used only occasionally? They, too, could be paid based on national norms, if they submitted a bill. The head surgeon could also receive some share of this for not using an assistant.

The second and third methods apply primarily to the inpatient condition packages. Paying the hospital for both Part A and B services is a radical departure from current practice but has considerable intuitive appeal and could lead to a more efficient mix of both physician and hospital inputs. Paying a preferred provider organization (PPO), on the other hand, while new, is an increasingly accepted form of practice. The only difference is that package payment would be based on a specific procedure or condition rather than total patient care.

Paying the "package" physician (the first method) is the one we have focussed on in our discussions of the equity and access implications of alternative reimbursement methods. The package physician could be the primary care physician, the admitting or attending physician, or the surgeon, depending on the type of package. Paying this physician has the major advantages of "delegating" to a single physician oversight of complementary medical services, which is a real weak point of current surveillance systems that focus on fees and not utilization. Other noteworthy advantages accrue to the patient in terms of better continuity of care and a reorientation of the system more in favor of primary, preventive over acute, expensive care.

Putting a single physician in charge of most, or all, of a patient's care would encounter widespread opposition, on the other hand, as inter-specialty relationships would be fundamentally changed. The packaging of multiple physician services would mean that independent billing by radiologists, anesthesiologists, and pathologists (RAPs) would be drastically reduced if not eliminated altogether. Incomes for RAPs would probably fall, or at least their rate of increase would be attenuated, as RAPs compete to provide packaged services. Perhaps as important to RAPs as the potential loss in income would be the threat to their professional independence. This type of package would place them in a secondary position relative to other specialties, as they would always be under the direction of the physician handling the package. This would not have to be a subservient relationship,

but it would probably be perceived as such. Although RAPs are the most obvious examples, other specialists would be similarly affected.

Primary care physicians themselves may resist such a pre-eminent role, even if they accepted it as the medically correct way to manage a patient's course of care, because of uncertainty. Uncertainty exists where their judgment conflicts with that of the specialist's. There is also the financial uncertainty, or risk, attached to any care they do not personally and completely provide.

Despite these problems, policymakers may still want to consider paying the package physician. It streamlines billing and encourages efficient use of all physician inputs.

### 1.6.2 What to Pay?

The packaging concept rests on the premise that the physician has considerable discretion over how many and what type of services to provide. For an inpatient pneumonia package, for example, some patients may require twenty hospital visits and others only five, but most may be seen ten times. Exactly who is seen how often and what tests are performed is left up to the physician under the various packages, making them less intrusive. Because the packaging concept eliminates the need to itemize and bill for every procedure separately, the insurer will never (and need never) know exactly how many hospital visits were provided.

For pricing purposes, however, insurers must know the expected bundle of services associated with each package. Is a pneumonia package worth \$50 or \$500 more than a hernia repair? Obviously, what insurers (and patients) are willing to pay for a given package will depend on the relative amount of physician effort and ancillaries they believe is involved. How should the bundle of services be determined for each package? There are two major methods for doing this: (1) the use of normative standards; and (2) empirical utilization of services.

Normative standards have been frequently used in quality of care assessments. Here a panel of experts commonly develops explicit criteria of care for each designated illness. Agreement among the experts can be obtained through the Delphi method or similar techniques. In the treatment of acute urinary tract infection, for example, particular laboratory tests would be expected to be performed; failure to do so would be considered poor quality care. A similar approach could be used for packaging. For each package, a

group of physician experts could determine the appropriate level of resource use, e.g., how often a hypertension patient should be seen and what the content of each visit should be.

The fatal flaw in the normative standards approach is that the physician experts tend to recommend "Cadillac" medicine. Brook (1973), LoGerfo, et al. (1978), and others have observed that when physician panels set pre-established explicit criteria for the management of selected illnesses, they tend to inflate the number of activities, procedures, tests, etc. that constitute quality care.

An alternative approach to establishing package content is to develop the bundle of services empirically from utilization data. Packages can be created ex post from billing claims, and average utilization determined across a large number of patients. Since this data base is composed of all physician claims, physicians who perform fraudulent or unnecessary care would also be included. In theory, inappropriate services could be deleted before calculating means, but except for a few obvious outliers, this would be very difficult in practice. In trying to determine appropriateness, we return to the same problems encountered in the normative standards approach, but for different reasons.

A related problem is that the use of relative package charges would preserve current reimbursement inequities, particularly the bias in favor of surgical procedures (Hsiao and Stason, 1979). Based on Medicare claims data from Michigan, for example, the ophthalmologist performing a lens extraction would receive payment 5-6 times greater than the medical specialist caring for a pneumonia patient. In fact, however, the latter patient may be far more time-consuming.

### 1.6.3 How Much to Pay?

Historically, Medicare has reimbursed physicians more or less, depending on their specialty and on their geographic location. Is this appropriate for package payments as well?

Geographic Location: Differential payment based on location was intended both to adjust for geographic cost-of-living differences and to preserve inter-area practice patterns. The first reason is understandable, but the second may introduce some undesired effects. We found, for example, that physician payments for a lens procedure DRG averaged 44 percent more in

Michigan than in South Carolina. Only 10 percentage points of this difference was due to geographic cost-of-living differences; the remainder was due to the significantly higher use of other physician inputs in Michigan, especially assistant surgeons and medical specialists.

These differences suggest that a national reimbursement rate may not be acceptable to physicians and that some local or regional adjustment might be necessary. On the other hand, practice patterns in some areas (like Michigan) may be inefficient, and it would not be desirable to incorporate such inefficiencies into the package rates.

Specialty: Should specialists be paid differently from GPs and should certain specialists be paid differently from others? There are four major approaches policymakers might take:

- (1) make no distinctions in reimbursement;
- (2) set different reimbursement rates for specialists;
- (3) define the packages differently for specialists; or
- (4) exclude some specialties when calculating reimbursement rates.

The first approach, to make no specialty distinctions in payment, has a certain intuitive appeal. If a GP can provide the same package of services as an internist, why pay the latter more? This approach should promote efficiency, by discouraging specialists from providing packages for which they are over-trained. Specialists presumably would gravitate towards the more complex (i.e., more expensive) packages. The potential problem here, of course, is that physicians may provide packages for which they are inadequately trained.

The current system operates now under the second approach, which generally reimburses specialists more. This is done either explicitly through a higher conversion factor (say, in a relative value scale), or implicitly by determining prevailing charges separately by specialty. This method would value packages differently depending on who is providing the services, rather than solely valuing the product. Some physicians argue that the service itself is qualitatively different when they do it. Internists, for example, maintain that their office visits involve a greater degree of "cognitive services" than those of other specialists and hence should be compensated more.



A third alternative is to define the content of the packages differently for different specialists. Thus an inpatient pneumonia package for a GP might be based on a less intensive bundle of services than one for internists, and priced accordingly less. The assumption here is that GPs would be seeing more routine, less complex patients who would not need to be treated as intensively. (This is not in fact the case, at least based on our Medicare claims data; the specialty of the attending physician explained only two percent of the variation in physician charges for pneumonia patients.) This approach would require perfect, or near perfect, triaging, to ensure that patients are seen by the appropriate physician. Of course, GPs would have an incentive to refer complex cases to specialists because of the higher costs involved. The major problem comes on the other side, as specialists would want to retain easy cases but continue to receive the higher reimbursement for them.

Finally, certain high cost specialties could be deleted from the base when calculating average package costs. Thus, cholecystectomy charges for thoracic surgeons would not be used to determine package reimbursement on the grounds that they are over-trained and too expensive. Thoracic surgeons would be allowed to provide a cholecystectomy package; they just would not be paid any more than general surgeons.

The first two methods (physician-wide and specialty-specific payment) are the methods currently used by Medicare to pay physicians, and thus have the weight of historical precedence in their favor. The latter two approaches, on the other hand, would require policymakers to decide which are the appropriate specialties for each package.

#### 1.6.4 What to Do About Assignment?

Can the issue of assignment be divorced from packaging? Certainly it can, if we are concerned only with a strict, administrative, interpretation of the law, but from a behavioral perspective serious doubts exist for so simple a solution. Voluntary assignment with packaging would present the physician with two options: (1) bill Medicare directly and receive an all-inclusive fee, paying other involved physician(s), if any, himself; or (2) refuse assignment and simply bill the patient for his own services. The second option, of course, is the non-assigned case. Here, the patient would receive 80 percent of the all-inclusive package fee from Medicare, and then be responsible for paying all physician bills as usual.

Why would a single attending physician ever accept assignment under such conditions, given the risk and hassle of negotiating and paying his colleagues? The answer is simple: only if he uses few, if any, other physician services. In this way he can pocket the difference between his own fee and the more global Medicare allowable. This can be illustrated by the following scenario. Assume that Medicare begins paying for inpatient physician services on an all-inclusive DRG flat rate. If the attending physician accepts assignment and Medicare pays him directly, he then pays each of his colleagues, as appropriate. If the attending physician refuses assignment, he bills the patient for his services. The patient, in turn, is paid the same flat rate by Medicare (less copays) and pays the individual physician bills on his own.

The advantage to the physician of accepting assignment has always been more certain payment, an advantage directly related to the size of the bill. Under packaging, that advantage would be offset to a large extent by the hassle of paying other physicians, and only really makes sense where it is minimal, i.e., no other physicians involved. Assignment rates for inpatient services could be expected to fall, and in the extreme exist only for single-physician cases. Such an outcome would leave the Medicare program with the worst of both worlds: paying the physician considerably more than necessary when the case is assigned, and the beneficiary paying considerably more out-of-pocket when it is not. The net effect is an income transfer from beneficiaries to physicians although the government's outlays are unaffected.

Putting beneficiaries at risk for multi-physician services can be expected to have important downstream effects. First, beneficiaries treated by non-assigning physicians will have much stronger incentives to switch physicians than before because of higher potential out-of-pocket costs. Market pressure, therefore, might "force" some physicians into accepting assignment. Second, higher all-inclusive fees would encourage some physicians to alter their mode of practice, cutting back on other physician inputs, and accepting assignment.

Could these positive downstream effects offset most, if not all, of the short-run fall in assignment? Probably not, especially in the case of acute hospital admissions: Beneficiaries generally do not know beforehand whether the attending physician will accept assignment and may be liable for large physician bills ex post. Switching is a limited threat in this case due to the non-recurring nature of many illnesses. Moreover, history suggests that

beneficiaries put at additional financial risk purchase supplementary coverage, drastically reducing the amount of switching in the system.

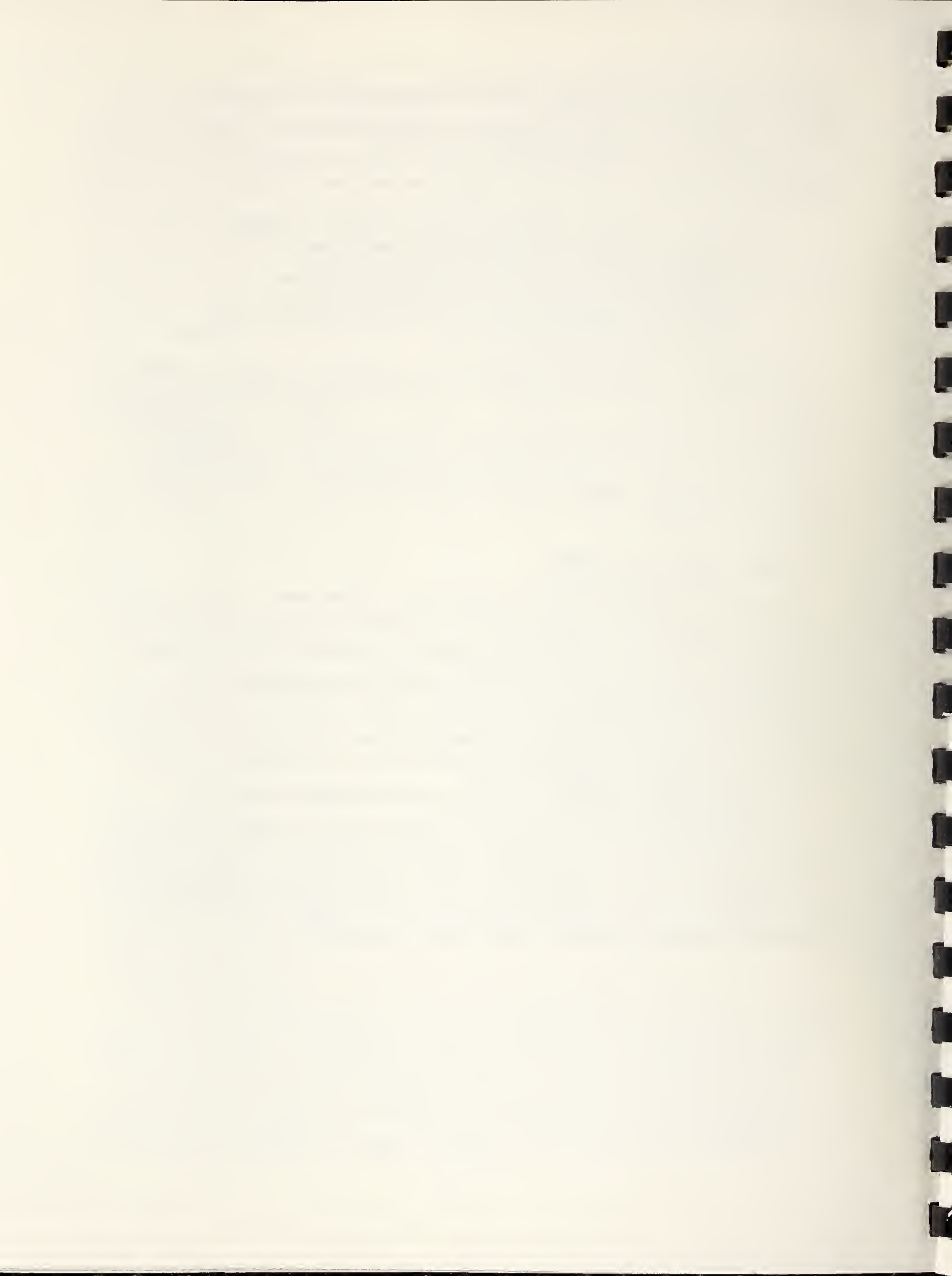
Thus, while it is administratively easy to divorce packaging from assignment, and it certainly makes implementation more flexible,

- from a behavioral standpoint, setting an all-inclusive package fee and continuing to permit physicians to refuse assignment should see assignment rates fall and the incidence of multi-physician care shifted from the government to beneficiaries, either directly through higher out-of-pocket payments or indirectly through higher supplementary insurance premiums.

In conclusion, this argument suggests that mandatory assignment may be a highly desirable adjunct to packaging. There is, however, one other approach policymakers could consider. This is to encourage assignment indirectly by giving beneficiaries a greater incentive to switch, e.g., through reductions or waivers of patient copays, as is currently being done under the Medicare HMO demonstrations.

#### 1.7 Organization of the Report

The report is organized in ten chapters plus appendices. Chapters 2 and 3 provide a more detailed discussion of proinflation and unbundling and the construction of the seven Alternative Reimbursement Methods (ARMs). Chapter 4 then begins the empirical work with a review of the data bases and how packages were formed, empirically, from claims data. Chapters 5-9 include the empirical work on five packages: collapsed, office visit, special procedure, ambulatory condition, and inpatient condition. Each chapter has more detail on how package scope was defined, followed by descriptive analysis of within-package price variation, in total and by specialty. Multivariate analysis is also performed to isolate the effects of specialty, location, and other physician inputs. Chapter 10 includes an extensive analysis of the distributional effects of ARMs, first, for patients, then for physicians. A glossary of surgical procedures can be found in Appendix C.



## 2.0 HISTORICAL AND POLICY OVERVIEW OF PHYSICIAN BILLING

### 2.1 The Evolution of Medical Procedure Terminology

Today, the vast majority of physicians are reimbursed on a fee-for-service basis, with roots going back as far as the Code of Hammurabi in Babylonian times. Fee-for-service reimbursement systems vary in methodology, but most of these variations can be fitted into the two general classes: (1) fixed fee schedules; or (2) Usual, Customary and Reasonable (UCR) payment. In either method, specification of the services is defined by a medical procedure terminology and coding system. The terminology is intended to help the physician describe the service(s) provided, and the numerical code assigned to each term expedites reporting and improves accuracy. The code also provides the third party with a simplified means of data entry and computer handling of the information.

Development of the medical procedural terminology and coding systems in current use began in the early 1940's with the provision of coverage for in-hospital surgery by Blue Shield Plans. By 1966, the AMA had published the first edition of its own Current Procedural Terminology (CPT-1), containing 2,084 separate procedures. Medicare's specification of the UCR payment system, and its coverage of physician services both in and out of the hospital, had a dramatic effect on procedural terminology and coding systems. The AMA's second edition (CPT-2) in 1969 contained 3,449 terms, a 65% increase. By 1977, CPT-4 contained 6,132 terms, a three-fold increase since its first publication eleven years earlier.

One of the major influences leading to two- and three-fold increases in the size of procedural terminology and coding systems has been the rapid increases in medical knowledge, technological developments, and the like. As new procedures have been developed (e.g., heart-bypass surgeries, fiber optics), terminology systems required updating to provide the means for reporting and reimbursing these procedures. Most of the other changes have come about for less well understood reasons, however, including: (1) the inclusion of out-of-hospital physician services, following Medicare's lead; (2) the widespread adoption of the UCR method for determining reimbursement levels; and (3) the increasingly direct control of state and local medical associations over terminology systems.

Fee-for-service billing clearly has many advantages; otherwise it would not have had such a long and prosperous history. First, and most important, "you get exactly what you pay for." Patients needing more tests or more

return visits pay more; those with simpler problems pay less. This is highly equitable. Second, it gives both physician and patient great freedom of choice. Neither is "locked-in" to each other. Physicians can charge whatever they feel their services are worth while patients can evaluate itemized prices and decide whether they need, say, the extra revisit. Third, patients willing to pay more can gain access to specialists more readily, as in other markets. And fourth, when a new technology is used, a charge is set and a payment made, which provides a financial incentive to innovation.

But if procedure-specific billing is so great, why does everyone want to get rid of it? The simple answer: insurance. With extensive coverage, none of us are matching actual fees charged against marginal preferences anymore, leading to overconsumption, waste, and inflation. A more complex answer takes into account the way in which procedures are defined and paid for under various insurance schemes.

## 2.2 Physician Billing and Payment Under Medicare/Medicaid

Services by physicians and other noninstitutional providers are reimbursed by Medicare under Part B of Title XVIII of the Social Security Act\* as a supplement to Part A hospital insurance. Physicians usually bill Medicare on a fee-for-service basis using a detailed procedure codebook containing thousands of codes. Each carrier has developed its own codebook, but they all generally group procedures in five parts: medicine (primarily visits and special studies such as ECGs), anesthesia, surgery, radiology, and pathology/laboratory. In an effort to standardize procedural nomenclature, the AMA has produced its own codebook; the most recent version is Current Procedural Terminology-Fourth Edition (CPT-4).

Administrative responsibility for the actual reimbursement of submitted charges is delegated to "carriers." About one-third of the 61 Medicare carriers are Blue Shield plans while the remainder are commercial insurers. Most are statewide although sub-state carriers exist (there are three in New York, for example). All must follow the reimbursement guidelines promulgated by the Health Care Financing Administration in Washington although flexibility in implementation is allowed.

The method of actually setting payment is generally known as "Customary, Prevailing, or Reasonable (CPR)," and is essentially the same as Usual, Customary, Reasonable (UCR) methods used by Blue Shield. Under CPR, the

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\*See Dutton and McMenamin (1981) or the Medicare Reimbursement Manuals for more detail.

carrier is required to keep a "profile" of submitted charges for each procedure for each physician receiving Medicare reimbursement, involving literally millions of charges per year.\* These physician-procedure profiles, which are updated each year, are used to develop two screens applied to each charge for each procedure submitted in the current year. The Level I screen is called the "customary" charge, and is the median charge derived from the physician's own procedure profile last year (e.g., \$35 for a new patient with a comprehensive exam). A Level II screen is determined by aggregating the customary charges (or profiles) across physicians in a "locality," again by procedure, and identifying the 75th percentile charge, i.e., the charge above 75 percent of the claims in that locality. This screen is called the "prevailing."

In order to limit payment increases to the inflation in practice costs, Medicare in 1976 instituted an adjustment to the prevailing called the Medicare Economic Index (MEI). The MEI ties the growth in any prevailing to the 1975 base period charges through an operating cost adjustment based on selected practice inputs (Dutton and McMenamin, 1981). The physician is then paid the lower of the submitted charge, the customary screen, the unadjusted prevailing, or the MEI-adjusted prevailing: this charge is called the "reasonable."

Medicare reimburses 80 percent of the reasonable charge, and the patient is responsible for the other 20 percent coinsurance plus any unmet deductible. Patients may also be liable for more than the reasonable charge if the physician chooses not to take the claim on assignment. On each and every claim for a visit, an ECG, an operation, the physician can accept Medicare's reasonable charge and bill the carrier directly on assignment, or he can refuse assignment and bill the patient for as much or more than Medicare would pay. In this case the patient is liable for the physician's whole charge, but can only collect 80 percent of the reasonable charge from Medicare.

Where the reasonable charge for a procedure is "generous," the physician is more likely to take assignment and not try to collect the whole bill from the patient. Also, he is more likely to accept assignment and the reasonable charge on large surgical bills where the patient is unlikely to afford much more than what Medicare is willing to pay (e.g., 20% of \$700 may already be

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\*Such detailed data processing effort could only be feasible using high-speed electronic computers, which may or may not be a salutary by-product of technical change.

the most patients could afford). What is key from a packaging perspective is the optional assignment clause, for packages that add to the physician's billing burden or reduce his payment will likely result in lower assignment rates and less of a change in practice behavior than if the option did not exist, the extra burden falling primarily on the patient. Expected impacts of various packages, therefore, depends a lot on any simultaneous changes in the case-by-case option.\*

### 2.3 How Procedure Terminologies Fuel Inflation

Basing current payment rates on previously billed charges, then allowing physicians the assignment choice as well, engenders strong inflationary incentives. This is why much of the recent policy discussion has focused on fee "caps" and constraining or eliminating the assignment option. What tends to be overlooked, however, is the unit of billing, namely, the procedure, which exacerbates the problem and frustrates attempts to control program outlays through price regulation alone.

Procedural detail has certainly multiplied, but exactly how does this contribute to expenditure inflation? The answer is, in two ways. First, with a greater number of procedures to choose from, the physician has more latitude in billing under a more complex, costly procedure code for the same service. If only one category existed for office visits, physicians could only bill under its code number, receiving a fixed reimbursement per visit. When the carrier allows for two or more codes, however, supposedly varying in complexity as well as payment (e.g., brief vs. complex office visits), the physician naturally has the incentive to "upgrade" his visits in nominal (name-only) terms to the more lucrative code. The more numerous the codes for any activity, the easier it is to subjectively rename a "brief" visit, "intermediate," and an "intermediate" visit, "extended." Upgrading services

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\*Medicaid is fundamentally different from Medicare in this respect. States may use the same CPR method for defining the reasonable charge, they may even use the same carrier, but patients never can collect from the program, only providers. Thus, refusing to accept the reasonable charge and billing the Medicaid patient directly means billing a poor, uninsured person, which is almost the same thing as providing free care. Moreover, many state Medicaid programs either apply further limits to the reasonable charge, making it more stringent, or simply set fixed fees per procedure for all physicians. For a description of the state reimbursement methods, see Muse and Sawyer (1982). An analysis of the factors influencing the decision to use a particular method can be found in Cromwell and Mitchell (1981).



for billing purposes without really altering the content of the service we shall call nominal procinflation (i.e., procedure inflation).

The second way in which procedure metastases fuel inflation is through the unbundling that goes hand-in-hand with the extra procedures. Lab tests are a good example. Newer medical terminologies encourage (if not require) physicians to list lab services separately from the physician component of the visit. Medicare, Blue Shield, and other insurers using UCR reimbursement methods screen and pay for visits and lab tests as if they were medically unrelated. Prior to the unpackaging of tests, the visit payment covered both components: that is, the physician (and auxiliary staff) time with the patient plus the total charge for lab tests. The principal effect of billing for tests separately is that no automatic constraint is placed on the frequency, or rate, of testing and special studies (e.g., ECGs). Medicare and other insurers focus entirely on price, not quantity, encouraging physicians to "make up" for fee reductions through unbundling with intensification.

Overwhelmed with millions of claims per year, it is all carriers can do to keep up with the exigencies of establishing screens on new variants of medical practice and limiting charges on old ones. Procinflation and unbundling with intensification go essentially unchecked, frustrating all efforts at expenditure control through fee regulation alone.

Faced with unacceptable growth in public outlays on physicians' services, both federal and state governments have initiated many reforms, a few specifically directed at the problems spawned by terminology multiplication. Medicare, for example, is now participating in several HMO demonstrations that pay providers a capitated, single rate covering physician, ancillary, and institutional services. And California recently passed bill AB 3480 that authorizes the Medi-Cal program "to contract with noninstitutional providers to deliver services to Medi-Cal [Medicaid] recipients in a manner which promotes case management, ...and to enter into capitated methods of payment to correct or prevent irregular or abusive billing practices" (IHPP, 1982).

#### 2.4 Implications of Packaging for Cost Control

Under this HCFA project, we have been exploring ways of dealing with the problem more directly through alternative reimbursement "packages." If CPT-4 can be modified, either prospectively by changing the terminology or retrospectively by combining separate bills, millions of dollars could be saved every year. Packages are proposed and analyzed that basically encourage

the physician to take a broader view of the patient care process, with incentives to cut back on marginal procedures. If successful, they would be a significant improvement over fee regulation alone, for they address "quantity" as well as price. Furthermore, they are less intrusive in the sense that physicians themselves are encouraged to monitor utilization instead of an independent, impersonal review organization run by the medical society or the carrier.

### 3.0 ALTERNATIVE APPROACHES TO PACKAGING PHYSICIAN SERVICES

#### 3.1 Introduction

The Current Procedural Terminology (CPT) manual now contains several thousand individual procedures in five major sections: medicine (or physician visits), anesthesiology, surgery, radiology, and pathology/laboratory. Depending on one's background and objectives, an almost infinite variety of combinations of procedures are imaginable, yet no single study can work with any but a very restricted number of packages if timely and thorough consideration is to be given to physician responses and administrative feasibility.

In recognition of our constraints, this chapter has two important objectives that, to a large degree, determine the scope and relevance of this study to the development of alternative billing methods. They are to

- (1) Construct a typology of package characteristics; and then
- (2) Use the typology in identifying a limited number of basic, archetypal packages.

##### 3.1.1 Definition of a Package

Before proceeding to the first task, however, let us first review what we mean by a "package." By package we generally mean "a group of related things offered as a whole," (Merriam-Webster Dictionary, 1974) which suggests the grouping of medical functions. When a physician conducts a comprehensive physical, he invariably records the patient's blood pressure, runs some lab tests, and learns something of the patient's medical history. Such a visit is clearly a package of functions: whether it is billed as such is another question.

Clearly, a distinction can be made between packaging separate functional activities and simply collapsing by reduction in the number of separate sub-codes of the same basic procedure. Under CPT-4, for example, six billing codes exist for physicians treating an established (as opposed to new) patient in the office: minimal, brief, limited, intermediate, extended, or comprehensive. The codebook even provides quite specific descriptions for distinguishing one from another, although it is still left to the physician to decide the appropriate code. Chest x-rays afford another excellent example. CPT-4 offers eight choices, depending on the number of views and the procedure used. Collapsing sub-codes would simply reduce the number of office visit codes from six to three, say, or the number of chest x-rays from eight to one.

How meaningful such fine gradations are, however, is certainly arguable,\* and recombining two or more visit or procedure categories through elimination and redefinition is logically appealing. Appealing, yes, but not packaging in the common sense of the word. Multiple functions are not necessarily being merged, but rather fine gradations of care are being suppressed.

Nevertheless, while we choose to distinguish between "true" packages that lump together different activities and "collapsed" packages that merely aggregate fractionated codes within the CPT-4 terminology, both represent important modifications in Medicare/Medicaid billing/payment procedures. This chapter, therefore, considers sub-procedure reduction as a viable alternative to the current terminology, even though emphasis is given to the aggregating of multiple, independent procedures into new "packages."

### 3.1.2 Prospective Versus Retrospective Packaging

One other semantic issue concerns "retrospective packaging," a method whereby the insurer allows physicians to bill using the fractionated terminology, then screens submitted charges using combined information on other visits, procedures, physicians, etc. Methods could range from an ex post collapse of six visit codes into, say, three, resulting in only three different payment rates for any physician, to a single visit fee determined by

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\*Consider the following definitions of an intermediate, extended, and comprehensive office visit supplied in the CPT-4 codebook (1981). As a test of native intelligence, could you identify which visit type is more-or-less complicated if the classification had not been provided?

**INTERMEDIATE LEVEL OF SERVICE:** A level of service pertaining to the evaluation of a new or existing condition complicated with a new diagnostic or management problem not necessarily relating to the primary diagnosis that necessitates the obtaining and evaluation of pertinent history and physical or mental status findings, diagnostic tests and procedures, and the ordering of appropriate therapeutic management; or a formal patient, family, or hospital staff conference regarding patient medical management and progress.

**EXTENDED LEVEL OF SERVICE:** A level of service requiring an unusual amount of effort or judgment including a detailed history, review of medical records, examination, and a formal conference with patient, family or staff; or a comparable medical diagnostic and/or therapeutic service.

**COMPREHENSIVE LEVEL OF SERVICE:** A level of service providing an indepth evaluation of a patient with a new or existing problem requiring the development of complete re-evaluation of medical data. This procedure includes the recording of a chief complaint(s), and present illness, family history, past medical history, personal history, system review, a complete physical examination, and the ordering of appropriate diagnostic tests and procedures.

the carrier for all physicians billing for a hypertension visit on an established patient. To the extent codebooks are not altered and physicians not made aware of the functions being combined, retrospective packaging can not be considered true packaging, although it is still of interest in any event.

### 3.2 Typological Criteria

Classifying individual packages by generic type is done according to the eight characteristics listed in Table 3-1. The single, most fundamental package dimension is the unit of payment. Most insurers pay strictly on the individual procedure, except for inpatient surgery and deliveries where associated visits are still combined. Four alternative payment units are possible: the office visit; the specialized (non-visit) procedure; the medical condition; and the beneficiary, or patient. Physicians would be paid for (a) providing office visits, (b) performing certain procedures, (c) caring for specific medical conditions, or (d) taking responsibility for the general care of patients.

Usually, it is desirable to make some adjustment for casemix, to recognize differing patient needs, although this would not have to be the case. Capitation plans, for example, make the physician responsible for all patient care needs. Episode-of-care packages, on the other hand, are meaningless without some recognition of casemix. Besides adjusting for individual patient needs, a casemix dimension may serve to limit the type of care covered. A physician who has agreed to provide total obstetrical care should not be liable for the patient's broken foot or brain tumor.

The most common casemix approaches would distinguish units of payment by visit or procedure type, as in the current terminology, or by diagnosis (e.g., hypertension), possibly with a further breakdown by visit type or patient demographics. Diagnosis-Related Groups (DRGs) for inpatients and Ambulatory Patient Groups (APGs) for outpatients are examples of diagnosis-modified classification schemes. Alternatives to diagnosis-based casemix approaches are Reasons For Visit (RFV) or Reasons For Admission (RFA), designed to account for varying motivations in seeking care and the resources used up without necessitating detailed diagnostic information. RFVs might distinguish between acute, chronic and preventive visits, for example. Other casemix indicators might be based on demographics like age or sex or program eligibility characteristics. Capitation packages, for example, could be based

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TABLE 3-1

CRITERIA FOR DEFINING PACKAGE TYPOLOGIES

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(1) Unit of Payment:

- Office Visit
- Procedure
- Condition
- Beneficiary

(2) Casemix Distinction:

- None
- Visit type, e.g., extended
- Diagnosis, e.g., hypertension
- Diagnosis-Related Group (DRG)/Ambulatory Visit Group (AVG)
- Reason For Visit/Admission (RFV/RFA)
- Demographics
- Eligibility

(3) Time Period:

- Immediate
- Fixed interval
- Variable, episodic interval

(4) Ancillaries:

- Excluded
- Included

(5) Providers:

- Single
- Multiple

(6) Scope of Services:

- Office visits
- Hospital Visits
- Surgery
- Visits, surgery, and other hospital costs

(7) Reimbursement Method:

- Prospective
- Retrospective

(8) Revision Method:

- Collapse
  - Package
-

on the Aged or Disabled Medicare populations separately, or AFDC vs. the Medically Needy in Medicaid.

The time period of care can be considered (a) immediate, (b) fixed interval, or (c) episodic. By immediate we do not mean instantaneous or even a single day: only that all the packaged services pertain to a single physician-patient encounter. Performance of these services may stretch out over a 2-3 day period as ancillary tests are run and interpreted, but rarely longer. Fixed-interval periods are distinct from episodic ones in that the period of procedure packaging is specified in terms of days, weeks, or months. Episodic care is for an unspecified time usually needed to cure an illness, which is impossible to define exactly. Fixed interval packaging is appropriate to recurring, chronic illnesses or preventive care while episodic intervals make sense only for acute illnesses where onset and cure are uncertain, but easy to measure ex post.

Ancillaries like lab tests, x-rays, and ECGs, may or may not be included in the package. Currently all but the simplest (e.g., blood pressure check) are billed separately, either by the physician who recommended, then performed, the test, or by another physician or independent laboratory. Packages can be devised which make one physician responsible for visit-cum-ancillaries irrespective of whether he/she actually performed the test, or less inclusive packages could keep visits and ancillaries entirely separate to conform with current billing procedures.

Closely related to the treatment of ancillaries is that of multiple providers generally. To the extent ancillaries are performed by someone other than the recommending/referring physician, multiple providers are involved. Another example is surgery, where anesthesia services are always needed and where the primary surgeon will occasionally require surgical assistance and consultations from other physicians. A surgical package could combine all three functions, making the primary surgeon financially responsible for paying his associates.

Packages may also involve various combinations of inpatient and ambulatory activity, reflecting a broad or narrow scope of services. Simple office visit packages would not consider inpatient care while surgical packages, as currently done, would obviously combine the surgical procedure with the pre- and post-operative follow-up in the hospital. Even more inclusive packages would bridge the inpatient/outpatient distinction by combining all activity. They could even go so far as to include traditional hospital costs like

routine nursing care and hospital-based ancillaries, turning the package into one of "case management."

Reimbursement method can either be prospective with independent procedures combined into bundles and a single code used both for billing and payment; or retrospective if one, less aggregated, terminology (e.g., CPT-4) is used by the physician for billing while another, more aggregated, terminology is used by the carrier for payment.

Finally, current procedure terminologies may be revised by collapsing the myriad sub-codes under a broader procedure, or by truly packaging independent, mutually exclusive functions. Reducing six types of office visits to three is an example of the former while packaging ancillaries associated with particular office visits is an example of the latter ("true" packages).

### 3.3 Basic, Archetypal Packages

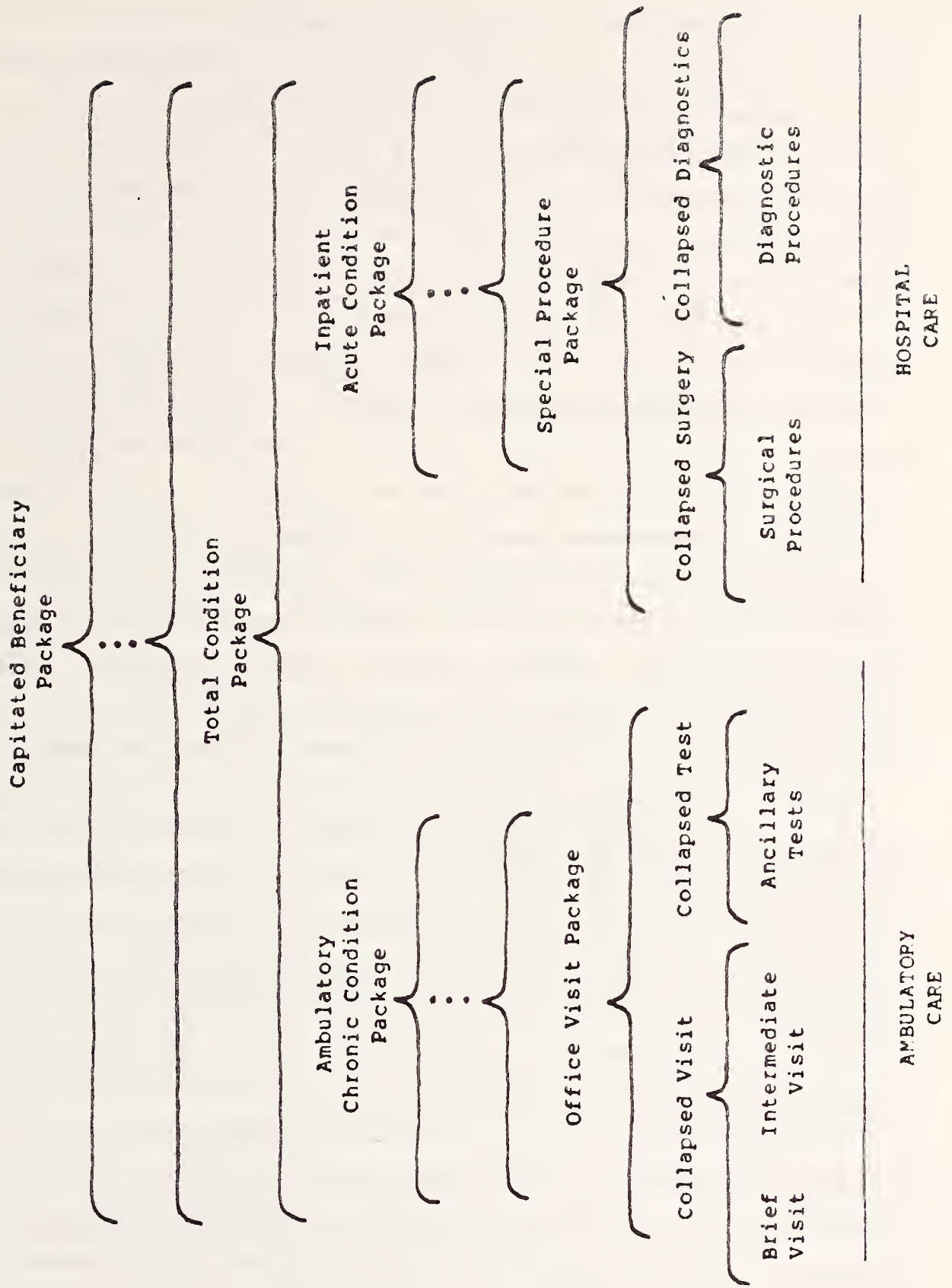
Using this eight-part typology, a limited set of seven basic packages can be described that serve as archetypes for more specific, operational packages. Figure 3-1 displays the set in hierarchical order, according to their scope of included services. As one moves up the pyramid, more and more services are packaged and paid for under a single fee.

Collapsed, or recombined, procedure packages (CPPs) form the lowest level. They would take selected generic procedures like medical office visits, radiological x-rays of the chest, and the like and collapse them by reducing the number of sub-codes. This is shown in Figure 3-1 by the merging of "brief" and "intermediate" office visits into one category, as one example. No casemix measure would be used. The time period would be immediate (or unchanged) covering just the length of time it takes to perform the procedure. Ancillaries, while subject to within-code collapsing, would be excluded from other visits, as currently done, with only single providers still involved. All medical (office and hospital visits), surgical and radiologic procedures would be candidates for recombining (although not across office and hospital settings). Finally, reimbursement could be based either prospectively on a new, simplified terminology or retrospectively on submitted detailed claims. In the latter instance, the procedural detail would not result in fine payment or screening distinctions but would be used to produce broader profiles (e.g., all 2 and 3-view x-rays for the chest, sternum, ribs, and spine).

Office visit packages (OVPs) form a second-tiered cumulation of office visits and associated ancillaries into a single line item on a claim. The



FIGURE 3-1: HIERARCHY OF PHYSICIAN PACKAGES



office visit itself would be the unique payment unit with some casemix distinction likely, such as visit type (new or established patient), diagnosis (e.g., cancer), an Ambulatory Patient Group, Reason For Visit (e.g., chronic, acute), or patient demographics (e.g., age). Two approaches could be taken to make casemix adjustments using diagnosis. The first would build on the DRG methodology used in hospitals by first "characterizing" the physician's casemix using diagnostic information on claims and then paying the physician a fixed fee for all visits, depending on his/her average complexity score. This approach would seem to have a number of limitations including considerable variations in casemix from month to month in any office practice. The second approach would be to develop diagnosis- or DRG-based bundles of office-cum-ancillary care and then pay a variable visit rate according to the mean cost or charge associated with each separate bundle. The time period would be immediate. Multiple providers (radiologists, pathologists, independent labs, etc.) would be combined into one bill and precluded from billing separately. Inpatient activity would be excluded. Reimbursement would be determined prospectively by merging ancillaries with office visits in the codebook and disallowing multiple provider bills for ambulatory services.

Still another basic packaging approach would focus on those special diagnostic or therapeutic procedures (SPPs) too uncommon to be packaged along with other ancillary services. As an analog to office visit packages, they would include both technical and interpretive components with no distinctions as to number of views, done at rest or in motion, etc. For a cardiac radioisotope scan, for example, services rendered by both cardiologists and radiologists would be part of a single package. Therapeutic procedures like surgery with anesthesia, assistant surgeons, and related x-rays would be packaged in the same manner. The unit of payment would be the primary functional procedure (e.g., a radioisotope scan and interpretation, a brain operation). Usually no casemix adjustment would be necessary due to the specificity of the procedure, although adjustments might have to be made for age and complicating conditions in certain cases. The time period would be either immediate in the case of a diagnostic test or episodic for surgical procedures requiring variable pre- and post-operative visits. Inpatient ancillary use may or may not be packaged. With special testing, the

associated supplies, film, and other consumables would likely be included unless routinely provided by the hospital or clinic.\*

Currently, practically all surgery is packaged to the extent that the surgeon's charge includes post-operative inpatient visits for normal, uncomplicated care.\*\* Further packaging of surgical procedures might (a) simply lump all "complicated" cases together in a second, DRG-like package (e.g., hernia repair with complications), (b) include hospital-supplied ancillaries which the surgeon orders, or (c) require that the physician's charge include all anesthesia, assistant surgeons, consultative, or other fee-for-service procedures like x-rays. Under (a) or (b) the package would still involve a single provider while under (c) multiple providers would be included in one bill.

Reimbursement could be either prospective or retrospective with packaged or collapsed revision of the terminology. Collapsed packaging would simply delete several detailed procedural options pertaining to number of views performed during rest or exercise, number of lesions, simple vs. complicated, etc. This could be done prospectively by streamlining the codebook or retrospectively by allowing each physician to bill separately, then lumping the charges together and paying a pro-rata share to each based on the mean charge for the whole package in a locality. Finally, a prospective package would combine several services with only one submitted charge.

An extended corollary to the office visit approach would be to package multiple office (and possibly inpatient) visits either on a fixed interval or episode for a medical condition, the next generic package type. Condition packages constitute the first real break with the procedure as the unit of

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\*A special procedure package could even include the cost of hospital inputs (e.g., surgical nurses, supplies, other ancillaries), making the physician primarily responsible for the procedure also responsible for all incurred costs associated with the procedure. This, again, treats the physician as a complete case manager responsible for all medical resources. As this is more like a fully capitated package, we leave it for last.

\*\*"Listed surgical procedures include the operation per se, local infiltration, digital block or topical anesthesia when used, and the normal, uncomplicated follow-up care. This concept is referred to as a 'package' for surgical procedures...[and] includes only that care which is usually part of the surgical service. Complications, exacerbations, recurrence or the presence of other diseases or injuries requiring additional services [should be reported separately]." (CPT-4, pp. 51-2)

payment. What would distinguish it from diagnosis-based office visit packages would be the extended time interval. For chronic conditions, a fixed interval, Ambulatory Condition Package (ACPs) would be established (e.g., diabetes management for three months) while in acute cases an open-ended, but finite, episodic time period would be used to construct Inpatient Condition Packages (ICPs). DRG-like methods could be used by combining claims from many physicians and averaging charges over the hospitalization to arrive at an average payment. For hospitalized acute patients, they have been referred to as "physician DRGs," while on an ambulatory basis, they are known as AVGs.

Total Condition Package: (TCPs) would go a step further and lump both inpatient and outpatient physician care together, but still only for a given medical problem.

The broadest package type of all would be based on the beneficiary as the unit of payment (e.g., the Medicare or Medicaid eligible). In this "package of condition packages," the physician would take responsibility for some or all of the patient's medical care for a fixed time interval, with or without any casemix adjustment. The physician may take responsibility only for the services he usually provides like visits, simple lab tests, and surgery if required, or the package could extend to all ancillaries and inpatient care, as with case manager schemes. Under the all-inclusive package without any casemix adjustment, complete capitation is achieved with the physician at risk for all utilization, if any, we call this the fully Capitated Beneficiary Package (CBPs). Casemix distinctions could be made based on patient demographics like age or eligibility (Aged vs. Disabled under Medicare; AFDC, Disabled vs. Medically Needy under Medicaid) to reduce physician risk. The package would obviously be prospective.

#### 3.4 What's Included in the Package?

So far, the discussion has been somewhat vague about exactly what services are to be included in a given package. The packaging concept rests on the premise that the physician has considerable discretion over how many and what type of services to provide. For an obstetrical condition package, for example, some patients may require ten prenatal visits and others only six, but most are seen eight times. Exactly who is seen how often and what tests are performed is left up to the physician under the various packages, making them less intrusive. Because the packaging concept eliminates the need to itemize and bill for every procedure separately, the insurer will never (and need never) know exactly how many prenatal visits were provided.

For pricing purposes, however, insurers must know the expected bundle of services associated with each package. Is an OB package worth \$50 or \$500 more than a hernia repair? Obviously, what insurers (and patients) are willing to pay for a given package will depend on the relative amount of physician effort and ancillaries they believe is involved. How should the bundle of services be determined for each package? There are two major methods for doing this: (1) the use of normative standards; and (2) empirical utilization of services.

Normative standards have been frequently used in quality of care assessments. Here a panel of experts commonly develops explicit criteria of care for each designated illness. Agreement among the experts can be obtained through the Delphi method or similar techniques. In the treatment of acute urinary tract infection, for example, particular laboratory tests would be expected to be performed; failure to do so would be considered poor quality care. A similar approach could be used for packaging. For each package, a group of physician experts could determine the appropriate level of resource use, e.g., how often a hypertension patient should be seen and what the content of each visit should be.

The fatal flaw in the normative standards approach is that the physician experts tend to recommend "Cadillac" medicine. Brook (1973), LoGerfo, et al. (1978), and others have observed that when physician panels set pre-established explicit criteria for the management of selected illnesses, they tend to inflate the number of activities, procedures, tests, etc. that constitute quality care. As Brook (1973) notes in his comparison of five peer review methods, even if an average of only 15 criteria had been applied to each condition, successful compliance with these lists would have doubled or tripled the number of physician services and laboratory tests actually performed. Although Brook questions whether this was due to the use of academic specialists to set criteria, Lyons and Payne (1977) found similar problems with criteria lists developed by non-academic physicians.

An alternative approach to establishing package content is to develop the bundle of services empirically from utilization data. Packages can be created ex post from billing claims, and average utilization determined across a large number of patients. Since this data base is composed of all physician claims, physicians who perform fraudulent or unnecessary care would also be included. In theory, inappropriate services could be deleted before calculating means, but except for a few obvious outliers, this would be very difficult in practice. In trying to determine appropriateness, we return to the same

problems encountered in the normative standards approach, but for different reasons.

A related issue is whether to preserve inter-specialty and inter-area variations in utilization when calculating these averages. The federal government, through its Medicare UCR system, PSRO programs, and other policies, has traditionally sought to maintain existing geographic differences in practice patterns. This could lead to excessively high reimbursement rates in physician-dense areas, however, if physicians in these areas prescribe more ancillary services and more return visits.

### 3.5 Advantages and Disadvantages to Different Packages

Any deviation from current reimbursement practices will result in some change in physician behavior. How do we decide whether the change is for the good? A set of criteria is needed for this purpose, which we have developed in four broad areas:

- efficiency (both in physicians' practices and systemwide);
- equity (to physicians and beneficiaries);
- feasibility (physician acceptance; carrier implementation);
- patient health (including continuity of care).

Table 3-2 lists the major advantages and disadvantages to the five approaches to packaging physician services. By simply reducing the absolute number of procedure codes, collapsed packaging can greatly reduce the number of codes physicians and third party payers must keep track of. This should constrain proinflation as well, as distinctions between codes become clearer and more amenable to verification. Further, in retaining procedure billing, collapsed packages would permit physicians to tailor bills to the medical needs of individual patients, thereby discouraging resource skimping. It would also be equitable to specialists who could continue to charge more for complicated procedures. Nevertheless, collapsed packages fail to address adequately the biggest problem: unbundling with intensification. They would also discourage physicians from accepting the Medicare rate as payment-in-full (i.e., taking assignment) on the higher cost procedures that may have been collapsed into a broader procedure code.

Folding in ancillary lab tests, x-rays, and ECGs with office visits to produce a single office visit package would not only reduce the paperwork of listing each test separately but should discourage unbundling. It should also

TABLE 3-2

ADVANTAGES AND DISADVANTAGES TO PACKAGING PHYSICIAN PAYMENT

ADVANTAGES	DISADVANTAGES
<u>COLLAPSED PROCEDURES PACKAGES</u>	
Reduces paperwork Less proinflation Retains illness-specific billing Highly feasible to construct Abuse surveillance maintained Minimum resource skimping Equitable to specialists	Fails to control unbundling Less assignment on high cost procedures
-----	
<u>OFFICE VISIT PACKAGES</u>	
Less ancillary unbundling Encourages price bargaining with ancillary providers Reduces paperwork	Encourages revisits Resistance by ancillary providers Difficulty in classifying patients by severity Skimping on necessary testing Less assignment for ambulatory care
-----	
<u>SPECIAL PROCEDURE PACKAGES</u>	
Fewer unnecessary surgical assists and consultations Encourages fee bargaining Reduced multiple billing Less hospital use	Resistance by hospital-based physicians Requires new procedure screens Skimping on technical support Less assignment of surgery, special tests
-----	
<u>CONDITION PACKAGES</u>	
Less unbundling and revisits Eliminates proinflation Reduces paperwork Eliminates procedure-specific profiles Makes primary physician a gatekeeper Encourages integrated patient care	Encourages casinflation Encourages "out-of-condition" billing Skimping on visits, testing Inequities for severe cases Cream-skimming within condition Resistance by specialists Encourages admissions (if payment DRG-based)
-----	
<u>BENEFICIARY PACKAGES</u>	
Less unnecessary inpatient use and surgery Less unbundling, revisits, and readmissions More preventive care Eliminates proinflation, casinflation Primary physician a gatekeeper Encourages integrated care Reduces paperwork	Less physician input and access Skimping on resources Inequities for severe cases Resistance by specialists Complicated implementation Cream-skimming

encourage physicians to shop around for the best price on ancillaries, an incentive totally absent from the current system. An immediate concern with going to a visit-cum-ancillary package would be the revisit rate. Physicians would have a clear incentive to increase patient contacts for any illness, spreading a fixed amount of testing over more visits to increase total reimbursement. Changes in ancillary billing would also have to be made, preventing labs and other ancillary providers from billing separately for tests recommended as part of ambulatory physician care.

Another implementation problem would involve developing meaningful visit categories for packaging ancillaries. The current Medicare CPT-4 terminology has 11 visit types, stratified by complexity and new vs. established patient. Significant within-visit variation in ancillary testing due to severity would lead to inequitable payments to physicians and, possibly, some skimping on ancillaries as a whole. How best to classify patients for ambulatory reimbursement would be one of the most difficult tasks in setting up packages -- as shown in a moment.

Special procedure packages would (usually) focus on complicated diagnostic and therapeutic procedures often done in the hospital that involve two or more physicians (e.g., CT scans, coronary bypass surgery, cardiac radioisotope scans). Surgeons' inpatient services are already packaged, and Medicare does not pay any additional bills for their pre- and post-operative visits in the hospital. Still, this package would go a step further by requiring physicians recommending the procedure to submit a single bill that included other physician services as well, e.g., the anesthesiologist, the assistant surgeon and the radiologist.

Fewer unnecessary surgical assists and x-rays are a logical advantage to such a package, as well as providing some encouragement to fee bargaining. If other hospital services such as operating room costs, lab tests, and routine nursing care were also included, the package would have profound implications for hospital costs generally. Nor is the idea as far-fetched as it sounds. The DRG prospective payment system, newly enacted by Congress, explicitly mandates HCFA "to begin to collect data to calculate physicians' charges for each DRG." While its intent is to tie physician charges to DRGs in some fashion, it is not yet clear how this would be done. Given the significant variation in treatment patterns within many DRGs, a procedure-based package may be more equitable and less costly on average.

Hospital-based physicians will strongly resist special procedure packages, as they could no longer bill Medicare independently. Even the billing



physician will be lukewarm to this package at best because of the added hassle of "negotiating" with assistants and specialists. This could lead to skimping on technical support services and lower assignment rates for these costly procedures.

Condition packages are like office visit packages that use diagnostic casemix stratifiers, but fundamentally differ in covering services over a specified period of time. They also share things in common with special procedure packages, except that payment is not tied to a specific procedure. One example of a condition package would be the ambulatory physician care required for six months in managing a hypertension patient, reimbursed monthly on a pro rata basis. Another example would be a pneumonia case in the hospital -- one of over 400 DRGs.

Like office visit packages, condition packages would discourage unbundling, but they would go another step in discouraging revisits as well (at least for ambulatory care). They would greatly streamline billing by eliminating procedure reporting. Procinflation would be abolished, as the unit of payment and mode of treatment would be separated; that is, procedures would be irrelevant to payment. Furthermore, if the package were extended to cover other specialist services as well, both in and out of the hospital, the primary care physician would necessarily fulfill a gatekeeper's role.

The Achilles' heel of all condition packages is the manner in which the "case" is defined. All the gains to this package depend on its integrity. If the range of services cannot be well specified in advance, or if the final set excludes care received in other locations (e.g., hospitals), then physicians have strong incentives to (a) take the condition's periodic payment as a base and bill for as many services as possible "out-of-condition," or (b) to casinflate by "upgrading" the severity of the patient's illness to receive higher reimbursement. Casinflation, procinflation, DRG creep, and cream-skimming are all manifestations of this definitional ambiguity, plaguing any system that attempts to categorize patients or services for the purpose of reimbursement. Furthermore, for DRG-based inpatient condition packages, strong incentives to readmit exist because payment is based on the admission and not completely on the condition.

Finally, we come to the fully capitated beneficiary package, a package of condition packages, if you will. Here, the primary care physician is obligated to provide all of the patient's medical needs, directly or through referral, regardless of medical problem. For this, the physician is paid a pro rata amount for every beneficiary under his/her care.

Fully capitated packages enjoy all of the advantages associated with condition packages, e.g., less unbundling, fewer revisits, plus they eliminate casinflation and the problems with "uncovered" services. They also encourage more preventive care and better continuity as well.

Beneficiary packages also evoke the same concerns as condition packages; namely, resource skimming, cream-skimming, and lack of physician access. Physicians also argue that they prefer being paid when they do something, not when they don't. Another major problem with this approach has to do with specialists. General practitioners are loath to decide when a specialist's services are required, particularly if patients need their authorization first. Failure to adequately monitor specialists has been the downfall of at least one of these kinds of packages (see Moore, et al., 1980, on SAFECO in Seattle). Primary care physicians are also reticent to take on the added risk of treating all a patient's problems under a fixed rate. Unless ways are devised to pool the risk across physicians and payers, the fully capitated package, without any severity adjustment, will be attractive only to the more entrepreneurial practitioners.

## 4.0 METHODS

### 4.1 Diagnosis and Procedure Selection Process

Table 4-1 summarizes the packaging approaches that we have constructed by medical service, diagnosis, and procedure.\* All packages described in the preceding chapter will be analyzed using the different procedures (or services) and diagnoses shown. The four diagnoses chosen were among the most common Medicare diagnoses for both short-term hospital stays (NCHS, 1982) and for physician office visits (NCHS, 1978). Two of these diagnoses, cerebrovascular disease and pneumonia, allowed us to construct inpatient condition packages both by diagnosis and by Diagnosis-Related Groups (DRGs). Using the remaining two diagnoses (essential benign hypertension and diabetes mellitus), we analyzed office visit packages as well as three-month ambulatory condition packages.

We also developed packages based on a range of diagnostic and surgical procedures (see Table 4-1). These services and procedures were chosen for primarily three reasons. First, we wanted to present packages for some of the more common procedures performed on Medicare patients. For instance, the surgical procedures, cholecystectomy and lens extractions are high frequency procedures in the 65 years and older age group (NCHS, 1982). Second, we wanted to look at packages for procedures which were not necessarily performed frequently but did represent high-cost procedures, (e.g., coronary artery bypass graft, total hip replacement, and colonoscopy). Finally, the selection process was aimed at also including procedures which would encompass a wide range of specialties. In this way we can compare charges and utilization rates for a gastroenterologist performing a proctosigmoidoscopy relative to those for an internist or general practitioner to determine whether specialty-specific differences arise in packaging.

### 4.2 Data Sources for Constructing Packages

Our empirical analysis of alternative packaging approaches rests primarily on two data bases: Michigan and South Carolina Medicare Part B claims data for 1981. We obtained all 1981 claims from the carriers in the two states.\*\*

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\*Because beneficiary packages are currently being examined through HCFA demonstration projects, we do not include them here.

\*\*We received claims for only a 20 percent sample of Medicare beneficiaries in the case of hypertension and diabetes.

TABLE 4-1

## TYPES OF PACKAGES TO BE ANALYZED BY SERVICE, DIAGNOSIS AND PROCEDURE

	Collapsed Procedure	Office Visit	Special Procedure	Ambulatory Condition	Inpatient Condition (Diagnosis/ Procedure)	Inpatient Condition (DRG)
<u>Medical Services</u>						
Office Visit	X					
Cardiac Catheterization	X		X		X	
<u>Diagnoses</u>						
Cerebrovascular Disease				X	X	X
Diabetes		X				
Hypertension		X		X		
Pneumonia					X	X
<u>Diagnostic Procedures</u>						
Arthrocentesis-Major joint			X			
Bronchoscopy	X		X			
Colonoscopy	X		X			
Cystourethroscopy	X		X			
Proctosigmoidoscopy	X		X			
Sigmoidoscopy	X		X			
Upper GI Endoscopy	X		X			
<u>Surgical Procedures</u>						
Cholecystectomy	X		X		X	X
Coronary Artery Bypass Graft	X		X		X	X
Inguinal Hernia Repair	X		X		X	
Hip Reconstruction or Replacement	X		X		X	X
Lens Extraction	X		X		X	
Pacemaker Insertion			X		X	
Prostatectomy	X		X		X	
Transurethral Resection of Prostate			X		X	X

Source: South Carolina and Michigan 1981 Medicare Part B Claims Data.

Rather than analyzing all packages with both data bases, we explored selected packages taking advantage of each state's unique features. Table 4-2 provides a condensed view of the data file construction for each diagnosis, service and procedure. It turned out to be difficult to analyze collapsed procedure packages using the Michigan claims data since there is far less fractionation in that state's procedural coding system than now available under CPT-4. The Michigan data did include all four digits of the ICDA-9 diagnostic codes on its claims permitting detailed analysis of condition packages based on diagnosis.

South Carolina, on the other hand, uses a more aggregate measure of diagnosis (a two digit variant of ICD-9) so we restricted the analysis of this state's data base to service and procedure-based packages. This is especially interesting since South Carolina physicians are reimbursed according to CPT-4, the coding system now being adopted by all Medicare carriers. We also created identical packages for the lens procedures (extractions) from both data bases. This enabled us to compare inputs and charges for the same package across two very different geographical areas.

We developed a number of algorithms for aggregating the millions of physician claims up to the patient level for the procedures and diagnoses shown on Table 4-2. These patient-level analytic files required considerable sorting and merging. We began first by sorting each state's raw data claims by the patient's identification number and selecting all their Medicare claims submitted during the year if they met the criteria for inclusion in any of the packages (e.g., patient had a cholecystectomy). The criteria were the definitional codes (presented in the table) identifying South Carolina packages by CPT-4 codes and Michigan packages by its state-specific codes and by ICD-9 diagnoses. The next step involved partitioning these claims into the specific packages by using date of service and location criteria for each procedure (diagnosis) of interest. Finally, we aggregated the claims billed for the different services provided in each of the packages up to the patient level. It was possible that patients could fall into more than one file; in these instances their claims history was duplicated and included in each of the files for which they were eligible.

An example might be of help in understanding how the analytic files were created. There were approximately 3.6 million claims from South Carolina that had to be sorted by the patients' ID numbers. Consider a cholecystectomy inpatient condition package: each time the computer ran across a claim with any one of the five CPT-4 codes (47600-47620) defining cholecystectomy

TABLE 4-2

## DATA FILE CREATION: SOURCES AND DEFINITIONS

	Data Source	Definition of Procedures or Diagnoses	Unit of Analysis	Number of Observations
<u>Medical Services</u>				
Office Visit	SC	CPT-4 90000-90080	Visit/MD	646,373
Cardiac Catheterization	SC	CPT-4 93510-93528, 93546-93549	Case	522
<u>Diagnoses</u>				
Cerebrovascular Disease	MICH	ICD-9 348.3, 348.8, 348.9, 349.89, 349.9, 430-437.1, 437.3, 437.8, 437.9, 784.3	Case	3,741
Diabetes	MICH	ICD-9 250.0-250.41, 250.6-250.91, 791.5	Visit/Episode	6,752/3,581
Hypertension	MICH	ICD-9 401.0-402.00, 402.10, 410.0-410.9 402.90, 404.0-405.99,	Visit/Episode	19,506/9,841
Pneumonia	MICH	ICD-9 074.1, 480.0-481, 482.2, 482.3, 482.8-483, 485-487.0, 511.0	Case	5,335
<u>Diagnostic Procedures</u>				
Arthrocentesis - Major joint	SC	CPT-4 20610	Case	1,383
Bronchoscopy	SC	CPT-4 31620-31659	Case	1,338
Colonoscopy	SC	CPT-4 45360-45386	Case	358
Cystourethroscopy	SC	CPT-4 52000-52110	Case	1,099
Proctosigmoidoscopy	SC	CPT-4 45300-45319	Case	1,581
Sigmoidoscopy	SC	CPT-4 45330-45334	Case	549
Upper GI Endoscopy	SC	CPT-4 43235-43264	Case	762
<u>Surgical Procedures</u>				
Cholecystectomy	SC	CPT-4 47600-47620	Case	1,302
Coronary Artery Bypass Graft	SC	CPT-4 33510-33518	Case	236
Inguinal Hernia Repair	SC	CPT-4 49505-49506	Case	807
Hip Reconstruction or Replacement	SC	CPT-4 27125-27131	Case	424
Lens Extractions	SC	CPT-4 66840-66850 66920-66940, 66980-66985	Case	3,083
Lens Procedures	MICH	PROC CODES 5491-5493, 5601-5621	Case	10,124
Pacemaker Insertion	SC	CPT-4 33205	Case	649
Prostatectomy	SC	CPT-4 55801-55845	Case	131
Transurethral Resection of Prostate	SC	CPT 4 52601	Case	2,300

procedures, that claim along with all the claims for the patient for the entire year were selected off the raw data file. This step left us with 44,488 claims. We then identified all claims associated with the hospital stay during which the cholecystectomy was performed: 13,945 claims in all. These remaining claims were aggregated to the patient-level giving us 1,388 unique cases for our cholecystectomy DRG file.

This is an extremely rich data base, as it includes not only billing data (charges, payments, utilization) but other information about the services provided; patient and physician descriptors were preserved as well. For instance, we know the following about any of the services contained in the cholecystectomy inpatient condition file:

- physician's usual charge billed by type of service
- Medicare reasonable charge by type of service
- whether the claim was assigned
- number of services performed
- service provider's ID
- service provider's specialty

We also kept general information pertaining to the patient including his/her identification number, sex, whether they were also covered under Medicaid, and their primary and secondary diagnoses. Two additional variables were available only on the Michigan Medicare claims: the patients' age, and reasonable charge locality (i.e., Detroit, other urban areas, and rural areas). In the chapters that follow, the analytic files created for each package approach are discussed in further detail.

#### 4.3 Critique of Data Bases: Strengths and Weaknesses

Both the Michigan and South Carolina data bases are particularly suitable for this packaging analysis since the vast majority of claims are unpackaged. Only in-hospital post-operative visits provided by the surgeon are routinely packaged with surgical procedures. This provides us with a complete itemized description of every physician service received by the patient.

The claims data also enabled us to test for a variety of different packages, based on a single procedure or diagnosis. Table 4-1 shows the number of different packages that we were able to create with the 20-odd analytic files. For example, we were able to create three of the five

packages plus the collapsed procedure (which is not a package per se) using the surgical procedure, coronary artery bypass graft. We also created identical packages from both Michigan and South Carolina claims in the case of lens extractions. This allowed us to analyze variations by state in utilization rates and charges for the same packages.

Another advantage to the data bases is that they contain so much detailed information on individual physicians' fees, utilization, and assignment patterns that it allows us to perform interesting tests related to costs, physician descriptors (i.e., specialty), diagnosis, etc. For example, do specialists produce more expensive packages because of the fees they charge, or because of the other physician inputs they use?

Despite the richness of these two data bases, there are some potential limitations. The most serious one is missing anesthesiologist fees for some of our surgical procedures. We know it is highly unlikely that any major surgical procedure like the ones we are analyzing can occur without administering anesthesia. Therefore, we can only assume that the anesthesiologist billed under Part A of Medicare. To overcome this data problem, we replaced any missing anesthesiologist's usual and reasonable charges with the average charges for those anesthesiologists who did submit a Part B claim for that particular CPT-4 procedure code. For example, let's suppose a surgeon performed a cholecystectomy with a cholangiogram (CPT-4 code 47605). If the corresponding anesthesiologist was missing, we replaced his missing values with the average usual and reasonable charges for those anesthesiologists billing for the same procedure code. Since anesthesiologists are reimbursed according to the anatomical area under surgery, there is relatively little variation in their fees to begin with. Therefore, the replacement of fees, while not perfect, is probably a good approximation of their actual fees. If we had not done so, the special procedure and inpatient condition packages would have been seriously underestimated, considering this service is a major portion of total package prices.

We also discovered an underestimation of lab tests and x-rays performed on in-hospital cases in both the Michigan and South Carolina claims data. Again, we believe this is because the hospital rather than the physician billed for these services. In the case of lab tests and x-rays, however, we decided not to replace missing values (or set minimum levels) because there is so much variation in the utilization rates and costs for them. It is unclear whether a patient actually had no x-rays or whether, in fact, they were billed under



Part A of Medicare. While non-replacement does introduce more variation into packages than probably actually exists, these costs represent a small fraction of total costs.

Another potential limitation may be the incompleteness of the claims data, as billing forms are often filled out retrospectively by office staff. These staff, in reviewing patient records, may overlook some services that were provided, thereby causing "gaps" in the patient's treatment regimen as it is observed through claims data. Only the actual medical records could help to fill in these gaps; however, we can assume that enough information will be available per diagnosis to enable us to develop average patient utilization profiles. Because physicians are paid based on submitted claims, nonreporting should be limited.

Finally, a certain amount of packaging may already take place within individual claims. If many physicians are including a number of procedures within a single bill, then our ability to aggregate separate procedures into bundled packages is limited. This problem should be minimal, however, given the degree of procedural detail in the coding terminology and certain administrative requirements. Clinical labs, for example, must bill separately rather than through the physician who orders the tests.

#### 4.4 Inconsistent Reporting of Surgical Procedures

It was discovered in our preliminary investigation of special procedure and inpatient condition packages that in a number of cases, surgeons, assistant surgeons, and anesthesiologists had reported different surgical procedures performed on the same day with the same patient (Mitchell and Cromwell, 1982). Inconsistencies in reporting among members of the surgical team occurred in a minority of cases but still was far too many to be ignored. For example, using Michigan 1980 Part B Medicare claims data, we found that surgeons reported a total of 1,121 cholecystectomies in which an assistant surgeon was involved. In over three-quarters of the cases (904/1,121), the surgeon and assistant surgeon agreed that they had performed the same cholecystectomy on a given patient. Twelve percent of the time (132/1,121), the assistant surgeon reported either a more complex or a simpler version of the cholecystectomy reported by the surgeon. In the remaining 10 percent of cases where the surgeon reported a cholecystectomy, the assistant surgeon billed for another type of operation entirely. Moreover, in 162 cases, the surgical assistant reported a cholecystectomy when the surgeon billed for something else.

Anesthesiologists exhibited even greater discrepancy in reporting with surgeons than did the assistants. In almost one-fifth (18%) of all cholecystectomies reported by surgeons, anesthesiologists billed for a different version of the operation. In another 10 percent of cases, they reported an entirely different operation. Similar results were found for total hip replacements (Mitchell and Cromwell, 1982).

The decision was made to investigate the extent of billing inconsistency by obtaining hard copy 1490 forms from the Part B carrier for a sample of cholecystectomy and hip reconstruction/replacement cases and comparing them with the operating room reports. About one-half of the inconsistencies could be attributed to coding errors on the part of either the physicians themselves or the carrier. In the remaining cases, however, we validated the inconsistent billing.

What are the implications of billing inconsistencies for packaging? If two (and sometimes three) physicians are together in the same operating room working on the same patient, how can they report even slightly different operations? One possible explanation is that a physician may simply not remember, when filling out claims forms at the end of the week, what operation was performed on patient X on day Y. It may also be true that the different procedure codes are not as meaningful as medical terminology advocates would like us to believe.

For anesthesiologists, the precise surgical procedure is probably less important than the general type or location of the surgery and other factors affecting patient risk, as mentioned earlier. Their reimbursement, furthermore, depends more on the time involved and the anesthesia base units associated with the procedure, rather than the procedure code itself. No similar explanation is forthcoming for surgical assistants, however, who presumably must know the precise surgical procedure; their reimbursement definitely does depend on the procedure code reported.

At this point, a decision had to be made as to how to proceed with our planned analysis of procedure-based packages. How should these packages be defined in the cases when the procedure the surgeon billed for is different from those reported by the assistant surgeon and/or the anesthesiologist? Further analysis of the operations anesthesiologists and assistant surgeons reported when a surgeon billed for a cholecystectomy revealed that many of the procedures (40%) were related operations in the biliary tract, and most of the remainder were various surgeries performed in the same anatomical area. Similarly, virtually all the other procedures billed by physicians when a

surgeon reported a total hip replacement involved the hip or femur. Therefore, our surgical packages were defined as only those in which the surgeon had reported the index procedure.

#### 4.5 Additional Physician Survey Data Bases

This study also explores the face validity of the CPT-4 office visit codes (see Chapter 5) as well as the impact of several different casemix measures on office visit packages (found in Chapter 6) using data from two additional sources. These are the National Ambulatory Care Surveys (NAMCS) and the USC-Mendenhall Survey of Medical and Surgical Specialties (USC).

##### 4.5.1 National Ambulatory Care Surveys (NAMCS)

The NAMC surveys provide an excellent data base for examining the resources associated with different types of office visit packages. We limited our analysis of alternative casemix adjustments for these packages to two NAMC surveys: 1979 and 1980. (A change in the coding system for diagnosis after 1978 (from ICD-8 to ICD-9), made pre-1979 surveys slightly incompatible with the two later years.) This provided us with information on 91,432 unique patient visits in about 4000 physicians' practices. Each NAMC survey is a nationally representative sample of office-based physicians including both MDs and DOs. Federal physicians and physicians specializing in anesthesiology, pathology or radiology were specifically excluded from the NAMC survey.

Physicians were sampled from nine specialty groups: general and family practice, internal medicine, pediatrics, other medical specialties, general surgery, obstetrics-gynecology, other surgical specialties, psychiatry, and all other specialties. Because NCHS did not stratify by individual specialty but rather by these nine specialty groups, sample sizes are fairly small for specialties subsumed under the "other medical" and "other surgical" groups. (For instance, a sample of allergists was not selected from the universe of all physicians but rather from a group of medical specialists which also included cardiologists, gastroenterologists, hematologists, etc.) Each survey physician provided information on approximately 30 patient visits, although the actual number of sample visits varied as a function of physician caseload. Thus, physicians with small medical practices might provide data on every patient seen during a seven day period, while those with larger practices provided information on only one out of every three patients, for example, or one out of five.

Briefly, the NAMC survey includes the following information for each visit sampled:

#### Physician Characteristics

- specialty
- MD vs. DO
- type of practice (e.g., solo, group)
- geographic location (region of the country, urban/rural)

#### Visit Characteristics

- age, sex, race of patient
- patient's reason for visit
- physician's diagnosis
- whether the physician had seen this patient before, and if so, if it was for the same problem
- time spent (in minutes) in direct contact
- diagnostic and therapeutic services

The NAMC survey collects ancillary services data on all services prescribed by the physician, even if he does not actually provide them. This is important for our purposes, as office visit packages would combine both the visit per se and all ordered services. Unfortunately, we cannot determine the volume of services from the NAMC survey, only whether at least one service of a given type was ordered. Thus, we may underestimate service intensity in some instances. For many diagnostic and therapeutic services, however, this is not a problem; only one Pap smear or one ECG would be performed during a given visit, for example. There were two other limitations for our purposes: (1) they include no physician fee data; and (2) they do not cover all possible ancillary services.

#### 4.5.2 USC-Mendenhall Survey of Medical and Surgical Specialties (USC)

The National Survey of Medical and Surgical Specialties conducted by the University of Southern California (USC) provides an excellent data base with which to validate the CPT-4 office visit categories. Like the NAMC surveys, it contains not only visit characteristics, such as visit length and ancillary use, but patient casemix information as well. A total of 10,631 physicians in 24 specialties were sampled from 1976 to 1978. Physicians were asked to complete a log diary on all patient encounters (both inpatient and outpatient, direct and telephone contacts) over a three-day period, yielding data on over 460,000 encounters in all.

The USC survey is a nationally representative sample of all nonfederal physicians within each of the 24 specialties surveyed, regardless of whether

or not they were engaged in direct patient care. First year residents (interns) and DOs were excluded. A stratified random sampling procedure was used in which the strata were defined by practice arrangement, i.e., solo, group, partnership, institutional or other arrangement.

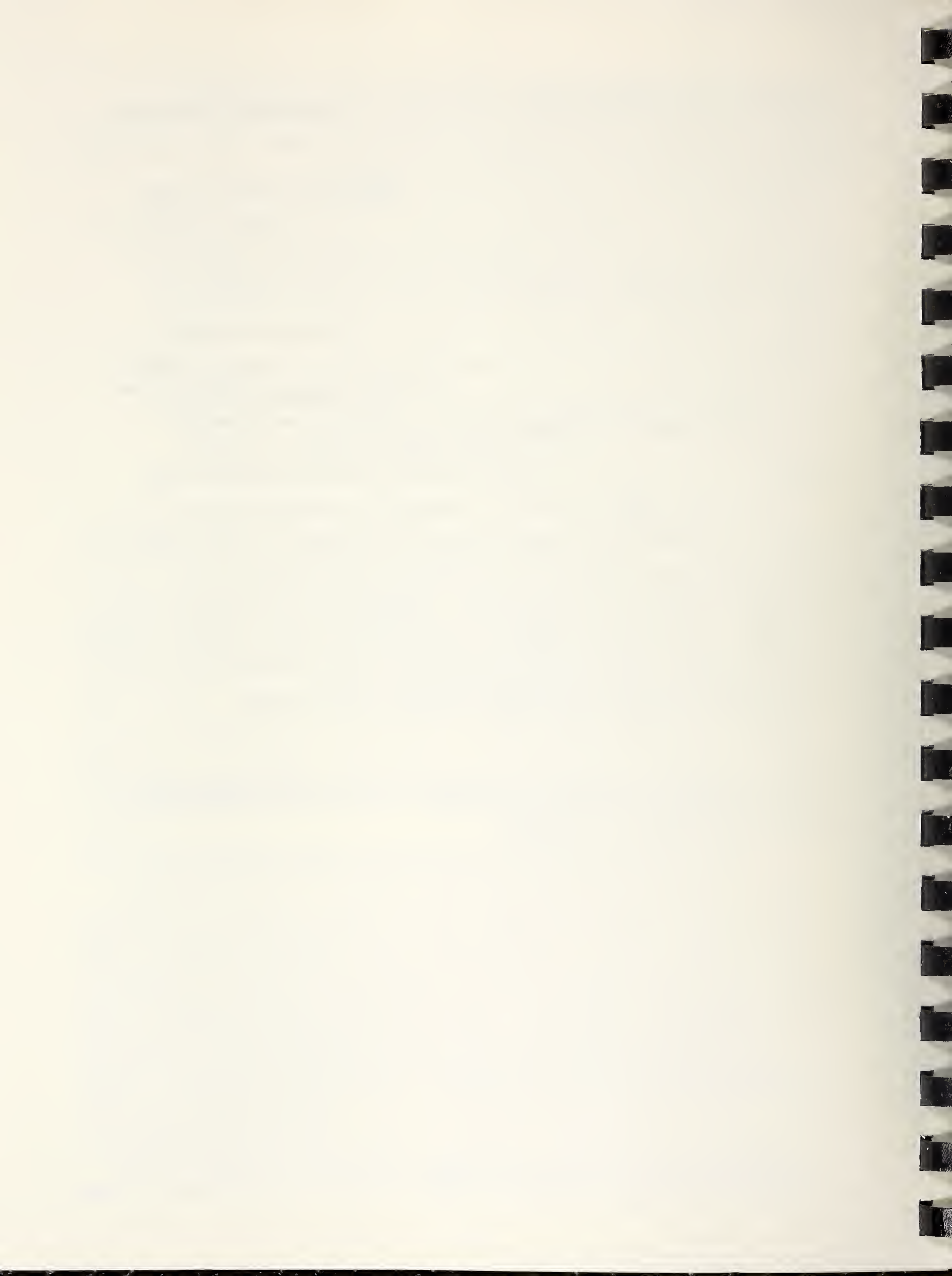
Data collection occurred serially (by specialty) over a 30-month period from 1976 to 1978. Each physician was asked to record detailed information on every patient encounter during an assigned three day period.\* This included direct patient contact in all settings, as well as telephone calls. The number of encounters recorded by the physician thus varied widely as a function of individual practice load during the three days in question.

Not surprisingly, given the time-consuming nature of the survey, physician participation rates in the study were considerable lower than those obtained in the NAMC surveys, where response rates averaged at least 70 percent. Response rates for USC sample physicians ranged from 34 to 84 percent depending on the specialty, but were generally in the 50-60 percent range.

In many ways, the Mendenhall data resemble the NAMCS data used to construct the office visit packages appearing in Chapter 6. They do differ in two important ways, however. First, unlike the NAMC surveys, the USC physician respondent was asked to note whether the service was actually performed or only ordered. And second, the Mendenhall study included a visit complexity measure which corresponds closely to the complexity measure used by CPT-4 (and identical to that used in CPT's third edition). The creation of this complexity measure is presented in detail in section 5.3.1.

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\*The USC survey also collected more summary information over a seven day period. We limit our discussion here, since it is the three-day recording period we will use in our analysis.



## 5.0 COLLAPSED PROCEDURE PACKAGES

### 5.1 Overview and Research Questions

Collapsed procedure packages are not true packages in the sense that they do not bundle together several medical procedures as other packages do. Rather, they simply involve reducing the number of related procedure codes associated with a generic procedure. This is the simplest form of packaging and is closest to the traditional fee-for-service approach since only the physician actually performing the procedure is affected.

This chapter presents an empirical analysis of collapsed packages for several diagnostic and surgical procedures and for office visits. In particular, the following questions will be examined:

- (1) What are physicians being reimbursed using the current fragmented procedure approach (CPT-4)?
- (2) What happens to Medicare expenditures and average physician reimbursement when multiple procedure codes are collapsed into one package?
- (3) Do inequities arise when procedure codes are collapsed and can two or three packages rather than just one alleviate these inequities?

It is important to examine whether multiple codes for the same kind of procedure actually represent substantive differences and, if so, whether physicians can reliably distinguish among these codes. We include an analysis of the validity of CPT-4 office visit codes in Section 5.3, as well as an analysis of the impact of collapsed office visit package on physicians' earnings.

### 5.2 Diagnostic and Surgical Collapsed Procedure Packages

A total of thirteen diagnostic and surgical collapsed procedure packages were created using 1981 Medicare Part B claims data from South Carolina.\* These procedures include:

#### Diagnostic Procedures

- bronchoscopy
- colonoscopy
- cystourethroscopy
- proctosigmoidoscopy
- sigmoidoscopy
- upper GI endoscopy

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\*Two procedures, pacemaker insertion and arthrocentesis, could not be collapsed since each consisted of only one CPT-4 code.

## Surgical Procedures

- coronary artery bypass graft (CABG)
- cholecystectomy
- cardiac catheterization
- lens extraction
- hernia repair
- hip reconstruction or replacement
- transurethral resection of prostate, prostatectomy

This section presents data for only four of the thirteen collapsed packages for illustrative purposes: two diagnostic procedures, colonoscopy and bronchoscopy, and two surgical procedures, coronary artery bypass graft and cholecystectomy. Tables detailing the usual and Medicare reasonable charges for the other nine collapsed procedure packages are presented in Appendix B 5. The CPT-4 coding system considers both diagnostic and surgical procedures as surgery. For simplicity, however, we refer to the physician who performed the diagnostic or surgical procedure as the "surgeon" regardless of whether he/she is actually a surgeon by training or a physician in another specialty (e.g., gastroenterology).

### 5.2.1 Diagnostic Colonoscopy

A colonoscopy involves inserting a flexible fiberoptic scope through the rectum to visualize the walls of the large intestine. At the same time the colonoscopy is done, biopsies may be obtained; bleeding may be controlled; or polyps may be removed. This diagnostic procedure is performed on patients presenting symptoms indicating the possible presence of cancer of the colon or rectum, ulcerative colitis, or polyps. CPT-4 allows surgeons to charge for any of twelve different procedures, six where the fiberoptic scope is inserted up to the first major bend in the large intestine (the splenic flexure) and six which extend beyond the splenic flexure.

Table 5-1 presents the surgeons' usual and Medicare reasonable charges for the twelve colonoscopy procedures, as well as one total collapsed procedure package (weighted average of all twelve), and two packages based upon how far the fiberoptic scope is inserted during the colonoscopy. Surgeons were reimbursed \$141, or 75 percent of their usual charge (\$188) for a basic diagnostic colonoscopy to the splenic flexure (45360). By doing the same basic diagnostic procedure but inserting the fiberoptic scope beyond the splenic flexure, a surgeon received \$126 more in Medicare reimbursements (\$267 - \$141 = \$126). Similarly, surgeons performing a colonoscopy with additional procedures, such as a biopsy, charged more for their services and



TABLE 5-1

## COLLAPSED PROCEDURE PACKAGE: DIAGNOSTIC COLONOSCOPY

CPT-4 Code	Procedure	Relative Frequency (n = 358)	Usual Charge	Medicare Reasonable
45360	Colonoscopy, fiberoptic, beyond 25 cm to splenic flexure; diagnostic procedure	0.28	\$188	\$141
45365	with biopsy and/or collection of specimen for cytology	0.05	251	222
45367	with removal of foreign body	0.00	--	--
45368	with control of hemorrhage	<sup>a</sup>	300	200
45370	with removal of polypoid lesion(s)	0.03	388	306
45371	with retrograde lavage (e.g., water pik)	0.00	--	--
-----				
Collapsed Procedure (CPT-4 codes 45360-45371) Package Price		0.36	\$211	\$165
Coefficient of Variation			46.7%	46.6%
-----				
45378	Colonoscopy, fiberoptic, beyond splenic flexure; diagnostic procedure	0.33	\$315	\$267
45379	with removal of foreign body	0.01	267	233
45380	with biopsy and/or collection of specimen for cytology	0.12	350	283
45382	for control of hemorrhage	<sup>a</sup>	400	275
45385	with removal of polypoid lesion(s)	0.18	452	349
45386	with retrograde lavage (e.g., water pik)	0.00	--	--
-----				
Collapsed Procedure (CPT-4 Codes 45378-45386) Package Price		0.64	\$359	\$293
Coefficient of Variation			29.1%	20.6%
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$306	\$247
Coefficient of Variation			48.7%	45.6%

<sup>a</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

were subsequently reimbursed more when they went beyond the splenic flexure than when they performed the identical colonoscopy procedure but only up to the splenic flexure.

If we collapse all twelve procedures into a single package (the total collapsed procedure package), surgeons would be reimbursed an average of \$247 per colonoscopy. They would lose anywhere from \$21 to \$102 in Medicare reimbursements on any colonoscopy travelling farther into the large intestine. Conversely, most physicians performing colonoscopies only up to the splenic flexure would receive additional Medicare reimbursements under the total collapsed package plan.

Colonoscopies beyond the splenic flexure do involve more skill on the part of the physician, however. A more medically appropriate package (and one presumably more acceptable to physicians) would be a more limited approach that collapses the procedures into two packages based on the distance that the fiberoptiscope is inserted.

The first package includes a colonoscopy to the splenic flexure with or without any additional procedures. Physicians performing colonoscopies in this package would receive \$165 from Medicare for their services. Any surgeon performing a biopsy as part of a colonoscopy would "lose" \$57 (\$165 vs. \$222). The second package features the remaining colonoscopy procedures which go beyond the splenic flexure. This package includes 64 percent of the colonoscopies performed with nearly half of them including some type of added service. Surgeons would be reimbursed \$293 per colonoscopy, an amount more favorable to them when compared to the total collapsed package price of \$247. Interestingly, the coefficient of variation for the charges in this package is considerably lower than that of the other collapsed package (20.6% vs. 46.6%). We would have expected more variation since procedures in this package occur more frequently than those in the first one. Less variation can be explained somewhat by the fact that these types of procedures are performed disproportionately more by gastroenterologists, and they are more often done in hospitals than in ambulatory settings.

Stepwise regression analysis was employed to explain this variation. The choice of surgeon may have a major impact on the colonoscopy price, not only because certain specialties charge higher fees than others, but also because they may perform colonoscopies in more "expensive" settings and/or may perform a more complicated type of colonoscopy. Column 1 in Table 5-2 shows the first step: variation in Medicare reasonable charges for a colonoscopy explained only by the specialty of the physician. The coefficients associated with the

TABLE 5-2

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR DIAGNOSTIC COLONOSCOPY

Variables	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	247
<u>Specialty of Surgeon<sup>a</sup>:</u>				
Gastroenterologist	28.50**	22.47**	1.86	0.41
Internist	24.42*	25.53**	8.19	0.18
Multi-Specialty Group	-26.70	-23.57	-7.64	0.09
Other Medical Specialist	-60.57**	-44.11*	-51.68***	0.04
<u>Location<sup>b</sup>:</u>				
Hospital	--	8.11	-0.20	0.78
Office	--	-82.05***	-33.18**	0.08
<u>Type of Colonoscopy<sup>c</sup>:</u>				
Up to splenic flexure with added procedures	--	--	103.48***	0.08
Beyond splenic flexure	--	--	120.80***	0.33
Beyond splenic flexure with added procedures	--	--	170.41***	0.31
CONSTANT	235.48***	236.67***	148.85***	--
R <sup>2</sup>	0.05	0.11	0.62	
(df)	(4,353)	(6,351)	(9,348)	
F	5.94***	8.63***	64.68***	

<sup>a</sup>General Surgeons are the omitted specialty.

<sup>b</sup>Outpatient department is the omitted location.

<sup>c</sup>Basic diagnostic colonoscopy up to the splenic flexure is the omitted procedure.

\*\*\* Significant at the 1 percent level.

\*\* Significant at the 5 percent level.

\* Significant at the 10 percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

specialty dummy variables provide us with a measure of both the direct effect of the specialist's higher fee and the indirect effect a specialist has because of the type of procedure he performs or where he performs it. The next two steps (columns 2 and 3) show the marginal effects of first, location, and then procedure type.

The choice of surgeon definitely does contribute to the colonoscopy price, as seen in column 1 of Table 5-2. Gastroenterologists charge \$28.50 more on average than do general surgeons (the omitted specialty), for example. However, once we adjust for whether the colonoscopy went beyond the splenic flexure or included a biopsy, most specialty differences disappear (see column 3). "Other" medical specialists continue to be significantly less expensive than other physicians. Colonoscopies with added procedures (like biopsies) and those that go beyond the splenic flexure, add \$103-\$170 more to the base price, even after holding specialty and location constant.

Based on column 2 of Table 5-2, we see that colonoscopies performed in the physician's office are \$82.05 cheaper than those performed in hospital or outpatient department (the omitted category). This is partly because office-based colonoscopies are less complex, but even after adjusting for procedure type, a colonoscopy performed in the office saves Medicare \$33.18 on average.

### 5.2.2 Diagnostic Bronchoscopy

Among all the surgical and diagnostic procedures examined, the one having the greatest amount of fragmentation, (largest number of different CPT-4 codes) is the diagnostic bronchoscopy. Surgeons have a choice of fifteen different codes, reflecting both the type of procedure performed (basic diagnostic bronchoscopy vs. biopsy, etc.) and the type of instrument used (flexible vs. rigid bronchoscope). Briefly, a bronchoscopy involves visually examining the lining of the bronchus by inserting a tube (bronchoscope) through the mouth.

Table 5-3 presents surgeons' usual and Medicare reasonable charges for the fifteen procedures, a total collapsed package, and three less extreme versions. A surgeon can choose to perform a basic diagnostic bronchoscopy with either a flexible or rigid bronchoscope. The flexible instrument is a relatively new innovation that is both easier for the surgeon to maneuver and is more comfortable for the patient compared with a rigid instrument. When a flexible bronchoscope rather than a rigid one is used during the basic diagnostic procedure, surgeons receive \$12 more (\$154 versus \$142) in Medicare

TABLE 5-3

## COLLAPSED PROCEDURE PACKAGE: DIAGNOSTIC BRONCHOSCOPY

CPT-4 Code	Procedure	Relative Frequency (n = 1,338)	Usual Charge	Medicare Reasonable
31620	Bronchoscopy; diagnostic, rigid bronchoscope	0.22	\$211	\$142
31621	diagnostic, fiberoptic bronchoscope (flexible)	0.27	221	154
-----				
Collapsed Procedure (CPT-4 Codes 31620-31621) Package Price		0.49	\$216	\$148
Coefficient of Variation			26.9%	25.7%
-----				
31625	with biopsy, rigid bronchoscope	0.08	\$269	\$215
31626	with biopsy, fiberoptic bronchoscope (flexible)	0.27	261	208
-----				
Collapsed Procedure (CPT-4 Codes 31625-31626) Package Price		0.35	\$263	\$210
Coefficient of Variation			29.6%	21.4%
-----				
31627	with brushing, fiberoptic bronchoscope (flexible)	0.06	\$245	\$162
31628	with transbronchial lung biopsy, fiberoptic bronchoscope (flexible) under fluoroscopic guidance	0.00	--	--
31630	with tracheal or bronchial dilation or closed reduction of fracture	a	225	225
31635	with removal of foreign body	0.00	--	--
31640	with excision of tumor	0.00	--	--
31645	with therapeutic aspiration of tracheobronchial tree, initial	0.04	228	194
31646	with therapeutic aspiration of tracheobronchial tree, subsequent	a	222	117
31650	with drainage of lung abscess or cavity, initial	0.00	--	--
31651	with drainage of lung abscess or cavity, subsequent	0.00	--	--
31656	with injection of contrast material for segmental bronchography (fiberscope only)	0.01	284	212
31659	with other bronchoscopic procedures	0.05	284	164
-----				
Collapsed Procedure (CPT-4 Codes 31627-31659) Package Price		0.16	\$254	\$173
Coefficient of Variation			26.9%	23.3%
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$239	\$174
Coefficient of Variation			29.7%	28.5%

a Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

reimbursements. A surgeon is also given the choice of using either type of bronchoscope when a biopsy is performed during a bronchoscopy. This time Medicare is more generous to surgeons using the rigid instrument (\$215) than when the procedure is performed with a flexible scope (\$208), essentially because physicians as a whole charge slightly more. It is not known why Medicare reimburses surgeons more for using a flexible instrument in one instance yet less in another. The addition of any other procedure done during the bronchoscopy varies in terms of both usual and Medicare reasonable charges, depending on the specific procedure performed. It is interesting to note that of the fifteen allowable procedures under CPT-4, South Carolina physicians performed seven of them less than one percent of the time in 1981.

Collapsing all fifteen procedures into one total collapsed package produced an average reasonable charge of \$174 per bronchoscopy. Surgeons performing biopsies and "other" procedures would lose money relative to what they now receive under CPT-4. A less radical collapsing strategy would yield three "packages", diagnostic only, with biopsy, or with any other procedure, producing average package charges of \$148, \$210, and \$173, respectively. These amounts are not that different from what physicians are paid currently; though administrative savings would be realized. There is little difference between the coefficients of variation for the total collapsed package and the three (less radical) packages suggesting collapsing all procedures into one package would not produce strong inequities for physicians performing them.

Stepwise regression analysis was used to explain bronchoscopy reasonable charges as a function of specialty, type of bronchoscope, and type of procedure.\* Compared with general and thoracic surgeons, medical specialists (internists, pulmonary disease specialists, and probably the multi-specialty group physicians as well) receive \$7-15 more, even holding the type of bronchoscopy constant (see Table 5-4). This can be interpreted as a premium paid to these specialties solely by virtue of their training. Ear, nose and throat (ENT) specialists, on the other hand, charge significantly lower fees than all other physicians. While procedures using flexible bronchoscopes are associated with higher fees than those with rigid (or unspecified) bronchoscopes (see column 2), there is no difference once we adjust

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\*There was little variation in where the bronchoscopies were performed, (95% of them were done in the hospital) therefore, location was not included in the regression analysis.

TABLE 5-4

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR DIAGNOSTIC BRONCHOSCOPY

Variables	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	174
<u>Specialty of Surgeon<sup>a</sup>:</u>				
Internist	9.61**	9.53**	7.06**	0.13
Thoracic Surgeon	-6.41	-7.71*	-5.39	0.13
Multi-Specialty Group	25.77***	29.06***	15.04***	0.11
Pulmonary Disease Specialist	17.19***	14.83***	14.77***	0.19
ENTs	-26.83***	-22.37***	-21.27***	0.03
<u>Type of Bronchoscope<sup>b</sup>:</u>				
Flexible	--	17.59***	4.21	0.61
Rigid	--	4.48	2.42	0.30
<u>Type of Procedure<sup>c</sup>:</u>				
Diagnostic only	--	--	-21.84***	0.49
Diagnostic with biopsy	--	--	36.80***	0.35
CONSTANT	168.16***	156.24***	164.36***	--
R <sup>2</sup>	0.05	0.07	0.34	
(df)	(5,1330)	(7,1328)	(9,1326)	
F	15.73***	15.52***	77.51***	

<sup>a</sup>General Surgeons are the omitted specialty.

<sup>b</sup>Procedures with unspecified type of bronchoscope are omitted.

<sup>c</sup>Procedures other than basic diagnostic or diagnostic with a biopsy are omitted.

\*\*\* Significant at the 1 percent level.

\*\* Significant at the 5 percent level.

\* Significant at the 10 percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

for whether a biopsy or other procedure was performed. This implies that the type of scope used is associated with the particular procedure done.

### 5.2.3 Coronary Artery Bypass Graft

A coronary artery bypass graft (CABG) involves bypassing the obstructed portions of one or more of the three major coronary arteries with venous grafts from the patient's leg or the internal mammary artery. CPT-4 allows surgeons the choice of six different CABG procedures based on the number of arteries bypassed, ranging from one artery (code 33510) to more than six (code 33516). The 1981 South Carolina claims data also included two codes appearing in earlier CPT updates. One of these was easily combined with the code representing two coronary arteries, but the other code (33518) was not readily compatible with any of the current CPT-4 codes. Table 5-5 shows that the surgeon's average usual and Medicare reasonable charges for this code were less than the new codes appearing in the fourth edition (three to six plus CABGs performed). One reason for lower charges associated with code 33518 is that most of these cases were performed prior to the July fee screen updates. It is also possible, however, that the additional fragmentation by number of arteries automatically results in an upgrading of the fee structure. In this analysis, we present procedure 33518 as a separate code.

When all CABG procedures were collapsed into a single package, physicians charged \$3,549 per operation and were reimbursed \$3,071, or 87 percent of their usual fee. Since the sample included only seventeen unique surgeon providers, there was relatively little variation in charges.\* Comparing this total collapsed package reimbursement price to the average prices found for the individual CPT-4 procedures, we find that surgeons who insert one or two bypass grafts would gain \$733 and \$263, respectively, while a surgeon performing more than two would lose between \$245 and \$326 per CABG operation (excluding the outdated code 33518).

Two less radical packages were created and compared to the prices of the CPT-4 coding system and the total collapsed package. Surgeons bypassing one or two CABGs would be reimbursed \$2,718, while those bypassing three or more

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\*Because of this lack of variation and the lack in variation by specialty (98% of sample were thoracic surgeons) and location (all CABGs done in the hospital), no multivariate analysis was conducted.



TABLE 5-5

## COLLAPSED PROCEDURE PACKAGE: CORONARY ARTERY BYPASS GRAFT

CPT-4 Code	Procedure	Relative Frequency (n = 236)	Usual Charge	Medicare Reasonable
33510	Coronary artery bypass, autogenous graft, e.g., saphenous vein or internal mammary artery; single artery	0.06	\$2,683	\$2,338
33511	two coronary arteries	0.25	3,121	2,808
-----				
Collapsed Procedure (1 or 2 CABGs <sup>a</sup> ) Package Price		0.31	\$3,037	\$2,718
Coefficient of Variation			13.6%	9.3%
-----				
33518	three or more coronary arteries <sup>b</sup>	0.35	\$3,672	\$3,096
33512	three coronary arteries	0.19	3,719	3,397
33513	four coronary arteries	0.14	4,105	3,326
33514	five coronary arteries	0.01	4,275	3,316
33516	six or more coronary arteries	0.00	--	--
-----				
Collapsed Procedure (3 or more CABGs) Package Price		0.69	\$3,778	\$3,229
Coefficient of Variation			12.5%	8.8%
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$3,549	\$3,071
Coefficient of Variation			16.1%	11.8%

<sup>a</sup> CABGs = Coronary Artery Bypass Grafts.

<sup>b</sup> Procedure code appeared in an earlier version of CPT-4.

Source: South Carolina 1981 Medicare Part B Claims Data.

would receive \$3,229 (including procedure code 33518).\* These two packages essentially reverse the 1981 revision of CPT codes.

What will surgeons do when they know they will not be reimbursed any more for doing five bypass grafts than for doing three? If surgeons decide not to bypass any "marginally" damaged arteries, it is unclear whether long-run outcomes are affected. Controversy has yet to be resolved in the medical literature as to whether "more" is better. Collapsing procedure codes into one or two packages may dissuade surgeons from performing any additional, unnecessary artery repairs without jeopardizing the quality of care that Medicare patients receive. If they do, the implications for reimbursement in the long run would depend on how package prices were updated in subsequent years.

#### 5.2.4 Cholecystectomy

CPT-4 includes codes for five different cholecystectomy procedures: a cholecystectomy with and without a cholangiogram, and three involving the exploration of the common bile duct. A cholecystectomy involves the removal of the gall bladder because of recurrent or chronic inflammations.

Table 5-6 shows surgeons charged, on average, \$676 and were reimbursed \$556, or 82 percent of their usual charge for a basic cholecystectomy. Performing a cholangiogram during the surgery added \$60 to the surgeons' fee, resulting in an extra \$22 in Medicare reimbursements (\$578 vs. \$556). Some form of exploration of the common bile duct occurred in 23 percent of the cases, adding between \$128 and \$188 to the reimbursement charge, over and above what was reimbursed for the basic cholecystectomy.

A reduction of procedural codes into one total collapsed package results in an average Medicare reimbursement of \$597. This amount would provide a disincentive for any surgeon "exploring" the common bile duct since they would lose anywhere from \$87 to \$147 per operation compared to what they now receive. A more moderate method of collapsing procedures would be to divide the five procedures into two packages consistent with the two Diagnosis-Related

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\*When we arbitrarily increased reimbursements for the outdated CPT-4 code 33518 by ten percent (under the assumption that this code was not affected by the annual update of fee screens for 1981), the package price for three or more CABGs becomes \$3,387, and the total collapsed package price increased \$108 to \$3,179.

TABLE 5-6

## COLLAPSED PROCEDURE PACKAGE: CHOLECYSTECTOMY

CPT-4 Code	Procedure	Relative Frequency (n = 1,302)	Usual Charge	Medicare Reasonable
47600	Cholecystectomy;	0.34	\$676	\$556
47605	with cholangiography	0.43	736	578
-----				
Collapsed Procedure (Cholecystectomy with cholangiogram) Package Price		0.77	\$709	\$568
Coefficient of Variation			22.3%	18.0%
-----				
47610	Cholecystectomy with exploration of common duct;	0.20	\$845	\$684
47611	with biliary endoscopy	0.01	1,128	708
47620	with transduodenal sphincterotomy or sphincteroplasty, with or without cholangiography	0.02	962	744
-----				
Collapsed Procedure (Cholecystectomy with exploration of bile duct) Package Price		0.23	\$866	\$690
Coefficient of Variation			26.3%	14.7%
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$746	\$597
Coefficient of Variation			25.3%	19.2%

Source: South Carolina 1981 Medicare Part B Claims Data.

Groups (DRGs) for cholecystectomies. The first package would include a cholecystectomy with and without a cholangiogram. Here, surgeons performing the simplest procedure would receive an extra \$12 (\$568 versus \$556) while those doing a cholangiogram would be reimbursed \$10 less. The second package includes three cholecystectomy procedures involving some form of common bile duct exploration. Surgeons performing transduodenal surgery as part of the cholecystectomy (only 2% of cases) would "lose" \$54, while the others are relatively unaffected. Coefficients of variation are quite low for both of these collapsed procedure packages, suggesting that this approach may be equitable for most physicians.

### 5.3 Office Visit Collapsed Procedure Packages

The CPT-4 classifies office visits into 11 categories, according to type of patient (new and established) and level of service. Table 5-7 provides definitions (according to the CPT-4) for the different levels of service. We can see that with so many levels of service to choose from for each type of patient, there is a genuine risk of procedure inflation. The more numerous the levels, the fewer differences there are between adjacent levels and the less distinguishable they become. Since the Medicare fee screens are based on the level of service reported, there is an incentive for physicians to report the higher of two adjacent levels when in doubt. Over time, physicians may also reclassify their visits to the next highest level in order to increase their reimbursement.

The sections which follow analyze whether physicians can distinguish between these fine gradations in visit levels, the reimbursement differences between them, and the revenue impact of more restrictive classification criteria. We begin our analysis by empirically testing the validity of having so many office visit categories. Then we analyze Medicare reasonable charges for the CPT-4 office visit codes as they now exist, and how these reimbursement levels change when visit levels are collapsed. Finally, we examine the potential impact of collapsing office visit codes on gross Medicare revenues, total Medicare expenditures, and assignment rates.

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TABLE 5-7

CPT-4 DEFINITIONS FOR PHYSICIAN OFFICE VISIT LEVELS OF SERVICE

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LEVELS OF SERVICE FOR NEW AND ESTABLISHED PATIENTS<sup>a</sup>

MINIMAL SERVICE:	A level of service supervised by a physician but not necessarily requiring his presence.
BRIEF SERVICE:	A level of service pertaining to the evaluation and treatment of a condition requiring only an abbreviated history and examination.
LIMITED SERVICE:	A level of service pertaining to the evaluation of a circumscribed acute illness or to the periodic re-evaluation of a problem including an interval history and examination, the review of effectiveness of past medical management, the ordering and evaluation of appropriate diagnostic tests, the adjustment of therapeutic management as indicated, and the discussion of findings and/or medical management.
INTERMEDIATE SERVICE:	A level of service pertaining to the evaluation of a new or existing condition complicated with a new diagnostic or management problem not necessarily relating to the primary diagnosis that necessitates the obtaining and evaluation of pertinent history and physical or mental status findings, diagnostic tests and procedures, and the ordering of appropriate therapeutic management; or a formal patient, family, or hospital staff conference regarding patient medical management and progress.
EXTENDED SERVICE:	A level of service requiring an unusual amount of effort or judgment including a detailed history, review of medical records, examination, and a formal conference with patient, family or staff; or a comparable medical diagnostic and/or therapeutic service.
COMPREHENSIVE SERVICE:	A level of service providing an in-depth evaluation of a patient with a new or existing problem requiring the development or complete re-evaluation of medical data. This procedure includes the recording of a chief complaint(s), and present illness, family history, past medical history, personal history, system review, a complete physical examination, and the ordering of appropriate diagnostic tests and procedures.

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<sup>a</sup>There is not a minimal visit for new patients.

Source: AMA's Current Procedural Terminology, Fourth Edition.

### 5.3.1 Validating the Office Visit Categories

Proponents of reimbursement policies based on CPT-4 argue that physicians can, in fact, distinguish between the different levels of visit complexity. Yet, is there any general agreement among physicians as to what constitutes a "limited" versus an "extended" visit, for example? Ideally, we would have liked to ask physicians but this clearly was not feasible. Fortunately, we had access to the USC-Mendenhall physician surveys which allowed us to directly measure physician time input and ancillary use associated with the CPT-4 codes. We can determine whether these codes truly discriminate across office visits of varying complexity and what might be the most medically appropriate strategy for collapsing them. This survey, conducted serially (by specialty) between 1976 and 1978, collected detailed information on over 460,000 patient encounters by 10,631 nonfederal physicians in 24 specialties. We limited our analysis to the two specialties primarily treating Medicare patients: general practitioners and internists.

Two variables in the USC survey allowed us to construct office visit categories which closely match the CPT-4 categories. Using the variable, "Seen Patient Before?", we were able to differentiate between office visits by new patients and office visits by established patients. Since only 4.1 percent of patients aged 65 and older were new patients, we limited further analysis to office visits for established patients. This left us with a sample of over 8,700 Medicare office visits for both specialties. The variable, "Encounter Classification: Complexity," enabled us to classify office visits by level of service. The levels of complexity in the USC survey are identical to the levels of service in the CPT-4 Manual except that the USC survey was based on an earlier CPT version (CPT-3) which did not contain the intermediate level of service.

We would expect office visits to vary systematically across these categories in a number of ways. First, in terms of the patient, office visits for new patients should take longer and involve more procedures than office visits for established patients. Unfortunately, since we have limited our analysis to established patient visits we cannot test for this. Second, patients with more than one diagnostic problem or whose conditions are more severe should require a higher level of service than for those less severely ill. Third, higher levels of service are expected to take longer, involve more ancillary procedures, and require greater "cognitive skills" (e.g., higher degree of professional knowledge, experience, and judgment). Finally,

visits may also vary systematically across the CPT-4 categories by physician specialty. Internists may have patients with more severe and/or complicating conditions than patients of general practitioners.

Office visits were found to vary across the CPT-4 categories in a number of expected ways. As the level of service complexity increased, we observed the following:

- visits became longer,
- more diagnostic procedures were ordered or performed,
- the patient's condition was more severe, and
- more patients had a secondary diagnosis.

Table 5-8 shows the length of visit by type of visit for GPs and internists. Comprehensive visits for GPs were 2 1/2 times longer than minimal visits; for internists, they were three times as long. Internists also had longer visits than GPs at every level of service, implying that higher reimbursements for specialists is due at least in part to greater physician intensity. Internists order or perform more diagnostic tests during their long visits, compared with GPs. This may be because internists have a more complex casemix than GPs, as proxied by a greater number of patients presenting secondary diagnoses.

In order to make simple comparisons of resource use across the visit categories, we constructed an intensity index similar to the one described in Chapter 6, (see Appendix A for more detail) except that this intensity index reflects only the medical procedures involved in an office visit and their relative values (prices), excluding length of visit. The value of the index should correspond to the CPT-4 category in which the visit is classified assuming more medical procedures are ordered and performed as the complexity of service increases. Higher levels of service did have higher intensity index values compared to lower levels of service\* (see Table 5-8). Index values for internists' office visits were also higher than those of GPs at all levels of service.

Next, we analyzed the visit categories constructed from the USC physician survey using five-group discriminant analysis, to test more rigorously whether they truly differ in "content." We hypothesized that the CPT-4 office visit categories differ primarily by length of visit and the procedures performed and ordered.

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\*The only exception being the lower intensity index value for a brief visit to an internist versus a minimal one.

TABLE 5-8

ESTABLISHED PATIENT OFFICE VISIT CHARACTERISTICS BY SPECIALTY

Established Patient Office Visits	General Practitioners (N = 4,523)		Internists (N = 4,185)	
	Length of Visit (in minutes)	Intensity Index	Length of Visit (in minutes)	Intensity Index
Minimal	8.5	0.38	12.2	0.83
Brief	9.9	0.50	12.2	0.72
Limited	12.0	0.72	16.1	1.07
Extended	15.9	1.25	23.0	2.14
Comprehensive	21.2	2.44	36.9	4.89

Source: USC - Mendenhall National Survey of Medical and Surgical Specialties.



The discriminant analysis (not shown) produced the following:

- length of visit and the intensity index significantly discriminate among the CPT-4 office visit categories for both internists and general practitioners,
- length of visit accounts for a greater percentage of the variation in the discriminant function compared to the intensity index, regardless of specialty.\*

We also tested how well length of visit and the intensity index could classify office visits reported in the USC survey into CPT-4 categories. We found the extreme categories, minimal and comprehensive visits, were better differentiated than the other visit categories for both specialty groups. Length of visit and ancillary intensity correctly classified only about one-third of the office visits for both GPs and internists. When the severity of the patient's condition, primary diagnosis, and presence of a secondary diagnosis were also included in the discriminant function, the proportion of visits in which the predicted category matched the one reported improved to 40 percent for GPs and 45 percent for internists.

While the office visit categories do differ significantly on the visit content measures, the strength of the relationship between the measures and the CPT-4 categories remains modest. Either the majority of the differences between the office visit categories reflect unmeasured variables, such as the cognitive skills involved, or differences simply are not that great among several of the CPT-4 visit categories. If the latter is true, this could be considered evidence that physicians cannot distinguish clearly between the various levels of complexity, and that the existing categories could potentially be collapsed into, say two or five groups -- a much more manageable number from the insurer's perspective.

### 5.3.2 CPT-4 Office Visit Charges

Given some evidence of face validity in the CPT-4 office visit categories, do prices follow a similar pattern? To answer this, we analyzed 1981 Medicare office visit claims data in South Carolina for the two specialty groups: general and family practitioners, and medical specialists (83% of whom were internists).\*\*

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\*For example, length of visit accounts for 11.9 percent of the variation for GPs while the intensity index accounts for only an additional 5.3 percent.

\*\*We combined the general and family practitioners into one specialty group and all medical specialists into another, in order to reflect the specialty screens used in South Carolina.

Table 5-9 provides information on relative prices across the 11 visit categories. Sixty percent of all visits in the sample were provided by GPs and FPs, with the majority of visits provided to established patients. In fact, for all physician visits, three categories for the established patient (brief, limited, and intermediate) constitute 90 percent of all visits. The comprehensive visit for both new and established patients is reimbursed at a much higher level relative to all other types. For both specialty groups, the comprehensive established patient visit is over two times the amount paid for an extended visit.

Two points can be made when comparing visit levels by specialty. First, medical specialists receive more for the same visit category than do their GP/FP counterparts. This is partly because medical specialists have more training than GPs and FPs, and thus, are perceived as having greater "cognitive skills". Specialists also may have patients with more severe and/or complicating conditions so that their visits take longer and require a higher degree of knowledge and judgment than the same level of service provided by GPs/FPs. (This appeared to be the case in our analysis of the USC physician survey data.) Second, there is a difference in the allocation of visits across categories by specialty. Medical specialists have more intermediate, extended, and comprehensive visits for established patients relative to GPs and FPs (19% for specialists versus less than 10% for GPs/FPs). This suggests that they either have a more complex casemix requiring more intense visits (as was found in the USC survey) or that they are simply more likely to report a higher level of service, i.e., procinflation, or both.

One way to test the validity of these price differentials is to analyze estimated payments per hour for specialties. We are able to do this using the time input data (length of visit) from the USC-Mendenhall survey together with the average reasonable charges appearing in Table 5-8.\* Briefly, hourly payments for the  $i$ -th physician and the  $j$ -th level of service ( $HP_{ij}$ ) can be written as

$$HP_{ij} = \frac{\overline{AP}_{ij}}{LOV_{ij}}$$

where  $\overline{AP}_{ij}$  = the  $i$ -th physician's average reasonable charge for the  $j$ -th level of service, and  $LOV_{ij}$  = the same physician's average length of visit (in hours) for the  $j$ -th level of service.

\*This analysis is not entirely consistent since we use length of visit data for GPs and internists from a national survey and average payments for GPs/FPs and medical specialists in South Carolina alone.

TABLE 5-9

MEDICARE REASONABLE CHARGES FOR PHYSICIAN OFFICE VISITS BY TYPE OF VISIT AND SPECIALTY<sup>a</sup>

CPT-4 Code	Office Visit	General/Family Practitioners N = 430,497	Medical Specialists N = 215,876	All Visits N = 646,373
<u>NEW PATIENT</u>				
90000	Brief service	\$9.25 (b)	\$8.39 (b)	\$9.12 (b)
90010	Limited service	9.04 (0.02)	13.29 (0.01)	10.13 (0.01)
90015	Intermediate service	13.46 (0.01)	16.68 (b)	14.55 (b)
90017	Extended service	17.95 (b)	25.31 (b)	21.46 (b)
90020	Comprehensive service	23.52 (0.01)	47.86 (0.03)	42.76 (0.02)
<u>ESTABLISHED PATIENT</u>				
90030	Minimal service	\$6.15 (0.01)	\$9.40 (0.01)	\$7.84 (0.01)
90040	Brief service	9.12 (0.05)	10.93 (0.06)	9.92 (0.05)
90050	Limited service	9.73 (0.81)	13.40 (0.70)	11.15 (0.76)
90060	Intermediate service	12.07 (0.07)	15.24 (0.11)	13.80 (0.09)
90070	Extended service	12.69 (b)	18.45 (0.01)	15.45 (0.01)
90080	Comprehensive service	25.16 (0.02)	45.55 (0.07)	40.27 (0.04)

<sup>a</sup>Relative frequency for each type of visit can be found in parentheses.

<sup>b</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

Table 5-10 presents estimated hourly payments for physicians treating Medicare patients. Two points are noteworthy. First, implicit hourly payments are invariant across four of five visit types where comparisons could be made. Apparently, the higher fees charged are indicative of the extra time physicians spend with patients. Comprehensive visits, on the other hand, "cost" roughly \$20 more per hour, which may or may not be justified on a cognitive-input criterion. Still, it is hard to explain a 40 percent premium over-and-above an extended care visit based on CPT-4 definitions alone (see Table 5-7).

A second point to be made is that, at every level of service, hourly payments for GPs/FPs are practically identical to those for medical specialists. Consider, for example, implicit hourly payments received for providing comprehensive office visits. General/family practitioners earn \$71 per hour ( $(\$25.16 / (21.2 \text{ mins}) * (60) = \$71)$ ); medical specialists, \$74 ( $(= \$45.55 / 36.9 \text{ mins}) * (60) = \$74)$ ). We might expect that specialists would be paid relatively more per hour than GPs based on greater training and casemix complexity. Given the relatively short visit lengths of GPs -- particularly for extended and comprehensive visits, it is also difficult to justify payments of \$12-25 per visit.

### 5.3.3 Two Collapsed Visit Packages

Although there are numerous ways to collapse office visits, we created two collapsed packages for illustrative purposes. Table 5-11 presents average reasonable charges for both collapsed approaches. The first package collapses the 11 visit codes into two types of visits according to the type of patient seen (new or established). Physicians seeing new patients would be reimbursed one rate and those seeing established patients would receive another, regardless of the work effort actually involved in the visit. A more moderate approach produces five codes: two in place of the five new patient visits (the brief and limited visits, vs. all others) and three for established patient visits. (See Table 5-11 for these collapsed visit code combinations.)

If no specialty distinction were made, physicians would receive \$25.62 for a new patient visit and \$12.51 for an established patient visit when the 11 codes are collapsed to two. (See the last two columns in Table 5-9.) The coefficients of variation in these reimbursement levels are quite high (60-70%), but calculating average reasonable charges by specialty would reduce the variation somewhat (44-60%). Internists and other medical specialists would definitely favor a collapsed approach that adjusts for specialty

TABLE 5-10

ESTIMATED HOURLY WAGES FOR PHYSICIANS PROVIDING OFFICE VISITS BY SPECIALTY

CPT-4	Office Visit	General/Family Practitioners	Medical Specialists
<u>ESTABLISHED PATIENT</u>			
90030	Minimal service	\$43/hr.	\$46/hr.
90040	Brief service	55	54
90050	Limited service	49	50
90060	Intermediate service	N.A.	N.A.
90070	Extended service	48	48
90080	Comprehensive service	71	74

N.A. = Not available because Mendenhall data did not include this level of service.

Sources: Average charges from South Carolina 1981 Medicare Part B Claims Data and length of visit data from U.S.C.-Mendenhall National Survey of Medical and Surgical Specialties.

TABLE 5-11

TWO COLLAPSED PROCEDURE PACKAGES BY SPECIALTY: PHYSICIAN OFFICE VISITS

	General/Family Practitioners N = 430,497	Medical Specialists N = 215,876	All Visits N = 646,373
	Price	Price	Price
	C.V.	C.V.	C.V.
<u>COLLAPSED PACKAGE #1</u>			
All New Patient Visits	\$12.88	\$37.98	\$25.62
	(48.7%)	(44.1%)	(69.7%)
All Established Patient Visits	10.13	15.80	12.51
	(43.9%)	(59.5%)	(60.0%)
<u>COLLAPSED PACKAGE #2</u>			
<u>New Patient</u>			
Brief/Limited	\$9.07	\$12.80	\$9.97
	(14.7%)	(24.2%)	(25.0%)
Intermediate/Extended/Comprehensive	18.53	43.69	35.53
	(34.9%)	(29.4%)	(45.7%)
<u>Established Patient</u>			
Minimal/Brief	\$8.67	\$10.63	\$9.57
	(52.8%)	(26.7%)	(41.8%)
Limited/Intermediate	9.91	13.66	11.41
	(38.5%)	(27.4%)	(36.8%)
Extended/Comprehensive	22.07	42.95	36.77
	(35.5%)	(26.7%)	(38.6%)

Dollar values represent Medicare reasonable charges.  
C.V. = Coefficient of variation.

Source: South Carolina 1981 Medicare Part B Claims Data.

differences. If specialty is not taken into account, they potentially can lose \$12.36 (\$25.62-\$37.98) for every new patient visit and \$3.29 on visits for established patients. GPs and FPs, on the other hand, would receive more from the version that does not make a specialty distinction.

The second collapsed package is less radical in that it reduces the number of visit categories to five rather than just two. The variation in charges is far lower than in the first package approach, suggesting this less radical collapsed plan would be more equitable (and hence more acceptable) to physicians. Again, we find that the medical specialists receive more when their specialty training is taken into account than when it is not.

A third collapse is suggested by Table 5-11, one that drops the "new" vs. "established" distinction in package #2 and lumps all visits into three categories:

- (1) minimal, brief, limited
- (2) intermediate, extended
- (3) comprehensive.

We chose to maintain the new/established distinction in deference to physician perceptions, but physician charge patterns certainly show no distinction within the three groups just identified.

#### 5.3.4 Simulation Analysis of Office Visit Collapsed Packages

Suppose Medicare actually reimbursed office visits according to one of the packages described in the preceding section. What impact would this have on physicians' revenues from Medicare? How would this compare with actual 1981 Medicare outlays? What are the characteristics of physicians who lose revenues when office visits are collapsed compared to those who gain? Would this approach have a disproportionately larger or smaller effect on physicians who take assignment?

To estimate the impact of collapsed packaging on revenues, we used all the Medicare office visit claims for any general/family practitioner, internist, and other medical specialist who provided Medicare visits during 1981 in South Carolina. These claims were then aggregated to the physician level, with 1,153 physicians in all.

#### Inequalities in Medicare Caseloads

As seen in Table 5-12, there is tremendous variation in the actual number of visits provided, ranging from a single visit during the entire year to 4,924 visits. One fifth of all Medicare office visits were provided by only

4.2 percent of physicians; these physicians each had Medicare caseloads in excess of 2,000 visits per year. Moreover, 18.3 percent of the physicians provided over half of all the Medicare visits while at the other extreme 27 percent had fewer than 100 Medicare visits in their office during 1981.\*

TABLE 5-12

SIZE DISTRIBUTION OF MEDICARE OFFICE VISITS PROVIDED BY PHYSICIANS

Medicare Office Visits	Percent of Physicians	Percent of Medicare Office Visits
1-100	27.0%	1.2%
101-500	32.7	16.8
501-1,000	22.0	27.8
1,001-2,000	14.1	34.0
2,001+	4.2	20.2

Source: South Carolina 1981 Medicare Part B Claims Data.

In order to illustrate these inequalities in the distribution of Medicare office visits across physicians, we constructed a Lorenz curve using the data from Table 5-12 (see Figure 5-1). The cumulative percentage of Medicare visits is plotted along the y-axis and the cumulative percentage of physicians along the x-axis. If office visits were perfectly distributed across physicians, all physicians would be seeing a small number of Medicare patients and the Lorenz curve would coincide with the straight diagonal line. Instead, the observed distribution indicates dramatic unevenness in the distribution of Medicare visits. A small number of physicians appear to have assumed responsibility, for whatever reason, for the majority of Medicare office visits. One reason for the uneven skewness may be the differences in practice casemix between the physicians.

The Gini Index of Concentration provides a summary statistic of the extent of inequality shown by the Lorenz curve, and is calculated as the ratio of the area between the diagonal and curved line (A) to that of the total triangle

\*As these physicians provided only 1.2% of all Medicare office visits, we dropped them from further analysis because collapsing their visits would have a negligible impact. This left us with 842 physicians.



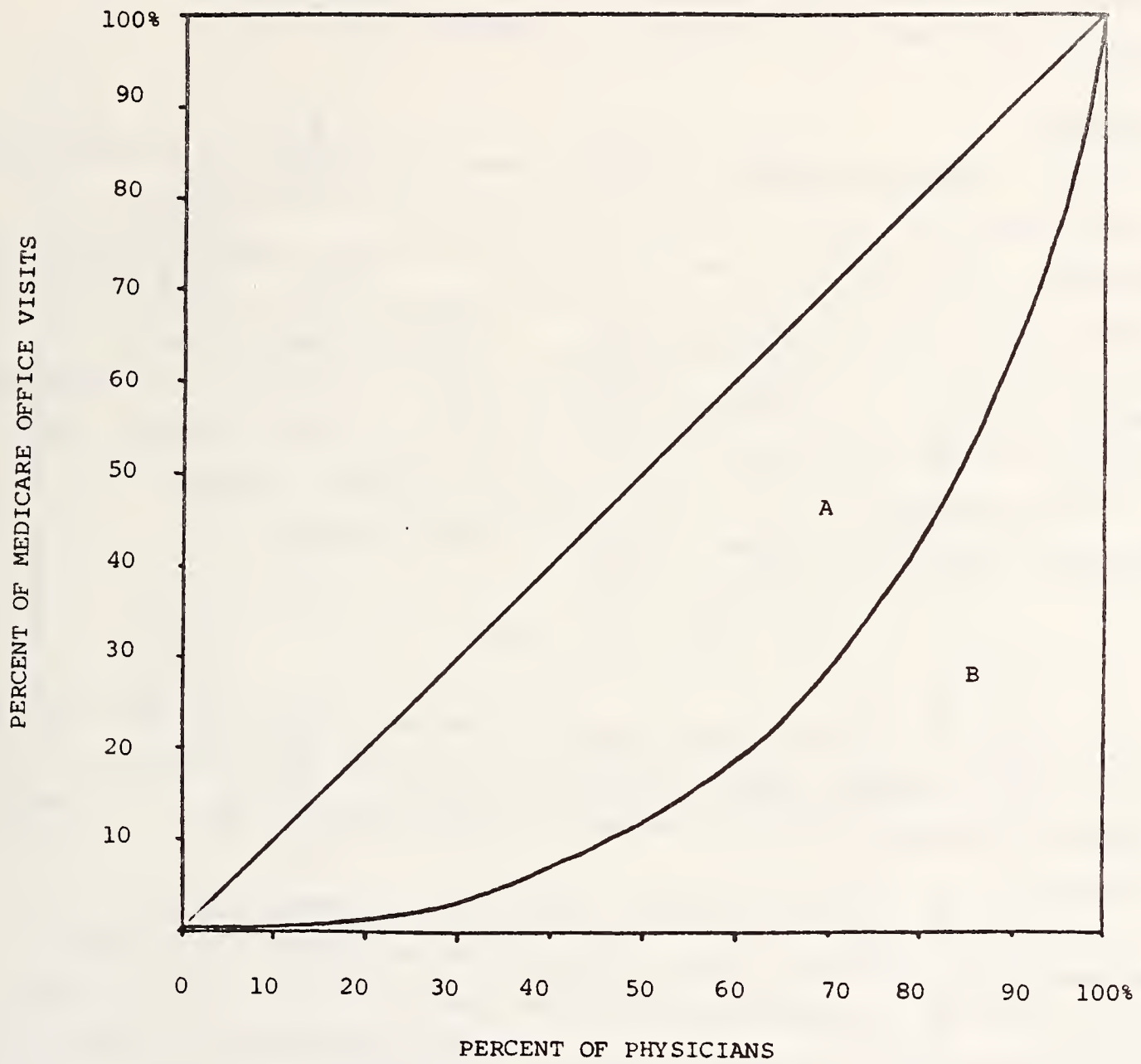


FIGURE 5-1. LORENZ CURVE OF MEDICARE OFFICE VISITS IN SOUTH CAROLINA

(A + B). It ranges from zero to one in value, with zero representing complete equality (i.e., the curved line lies on the diagonal) and one, perfect inequality. The Gini Coefficient for Medicare office visits in South Carolina is 0.54, indicating an evenness in the distribution of visits provided by physicians. Interestingly, earlier work by Mitchell and Cromwell (1981) showed the Gini Index for Medicare visits by primary care physicians and medical specialists to be 0.54 and 0.43, respectively.

### Simulations

What are the implications of such an uneven distribution in visits? The answer depends on who wins or loses under collapsed visit packaging. If physicians providing only a small proportion of overall Medicare visits are losers under packaging, they may leave the program without upsetting patients' access to care. Serious consequences (i.e., limited access to care) are implied, however, if collapsed packaging results in major financial losses to those physicians who provide the majority of Medicare patient office visits.

We can simulate the impact of office visit collapsed packages on physician's Medicare revenues using the following formula. Let

$$G(L) = \sum v_i (AP_i - CP_i)$$

be the gains (or losses) for each physician where  $v_i$  = the  $i$ -th level of service,  $AP_i$  = average reasonable charge for the  $i$ -th level of service (before collapsing), and  $CP_i$  = average collapsed price for the  $i$ -th level of service.

For example, suppose there was a physician (Dr. Unpack) who had 250 Medicare office visits in 1981, 100 of them being "limited" new patient visits, and 150 "intermediate" established patient visits. Using average reasonable charges from Table 5-9 and collapsed package prices (shown in Table 5-11), we find Dr. Unpack enjoys Medicare revenue gains equalling \$1,355.50 ( $=100(\$25.62-\$10.13)+150(\$12.51-\$13.80)$ ) when the first collapsed package is used. However, he loses \$374.50 when visits are collapsed into five groups. But what about all physicians in South Carolina? Would they gain as a whole from either of the package approaches? Who would win or lose?

Using the collapsed package prices from Table 5-11, we simulate revenues as shown in Table 5-13. Two versions of each collapsed package were used; the first reimburses according to specialty while the second does not. If CPT-4 visit codes are radically collapsed to just two categories (package #1), total

TABLE 5-13

IMPACT OF COLLAPSING OFFICE VISITS<sup>a</sup> ON GROSS MEDICARE REVENUES: SIMULATION RESULTS BY SPECIALTY

	General/Family Practitioners		Medical Specialists		All Physicians	
	Revenues (in millions)	Percent Change	Revenues (in millions)	Percent Change	Revenues (in millions)	Percent Change
<u>1981 Actual Medicare Revenues</u>	\$4.50	--	\$3.52	--	\$8.02	--
<u>Simulated Revenues</u>						
Collapsed Package #1						
With Specialty Adjustment	\$4.40	-2.2%	\$3.58	1.7%	\$7.98	-0.5%
No Specialty Adjustments	\$5.57	23.9%	\$2.80	-20.5%	\$8.37	4.4%
Collapsed Package #2						
With Specialty Adjustment	\$4.37	-2.8%	\$3.45	-2.0%	\$7.82	-2.4%
No Specialty Adjustment	\$5.19	15.5%	\$2.90	-17.6%	\$8.09	0.9%

<sup>a</sup>Collapsed Package #1 = 2 visit groups based on type of patient seen.

Collapsed Package #2 = 5 visit groups (2 for a new patient and 3 for an established patient).

Source: South Carolina 1981 Medicare Part B Claims Data.

Medicare revenues would fall from \$8.02 to \$7.98 million when specialty fee differences are allowed, causing only slight losses and gains for GPs and specialists, respectively (compare line 2 with line 1).<sup>\*</sup> If no specialty distinction were made, gross Medicare revenues for all physicians increase by 4.4 percent to \$8.37 million. More importantly, though, GP/FP revenues increase 24 percent (from \$4.50 to \$5.57 million) at the expense of medical specialists who lose almost as much.

The second, less radical approach to packaging essentially provides the same results. When we collapse visits and pay all physicians the same price, regardless of their specialty, marked changes in revenues occur by specialty group, although not quite as large as before. Internists and other medical specialists still would suffer tremendous losses when they are no longer able to receive more per visit than GPs/FPs just because of their specialized medical training. (Remember, the second approach allows for more inter-specialty variation in visit complexity.)

Clearly, who wins and who loses depends on how the visits are collapsed (two groups versus five) as well as how reimbursement prices are averaged (for all physicians or by specialty). Table 5-14 identifies the "winners" and "losers" of the two packages under the four scenarios. Losers are defined as physicians who lose more than ten percent of their actual 1981 Medicare office visit revenues once visits are collapsed while winners are those who would derive windfall gains in excess of ten percent of their 1981 revenues. The table provides a breakdown by specialty of the winners and losers in order to see if there are specialty differences.

Looking at Table 5-14, the majority of physicians (56%) realize no significant change in total Medicare revenues when visits are collapsed into "new" and "established" and specialty adjustments are made. Internists show the most change of any specialty, with 25 percent losing and 29 percent winning even with specialty-specific fees. Ironically, a greater percentage (30%) of the GPs and FPs lose Medicare office visit revenues even though a much higher percentage are unaffected versus internists.

When visits are collapsed into five groups (and specialty differentiation is allowed), many more physicians within each specialty who incur no change in revenues. Like the first package, there are more GPs and FPs in the loser

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<sup>\*</sup>Recall from Table 5-11 that the coefficients of variation were lower when reimbursements were averaged by specialty than when they were averaged for all physicians.

TABLE 5-14

WINNERS AND LOSERS OF COLLAPSED OFFICE VISIT PACKAGES BY SPECIALTY<sup>a</sup>Collapsed Package #1 (2 categories)

Specialty	Specialty-Specific Fee		Physician-Wide Fees	
	Losers	Winners	No Change	Winners
General Practitioners	31%	9%	22%	73%
Family Practitioners	30	9	19	79
Internists	25	29	14	6
Other Medical Specialists	19	19	11	2
ALL PHYSICIANS	29	15	19	51

Collapsed Package #2 (5 categories)

Specialty	Specialty-Specific Fees		Physician-Wide Fees	
	Losers	Winners	No Change	Winners
General Practitioners	29%	7%	29%	65%
Family Practitioners	24	4	22	76
Internists	18	15	15	3
Other Medical Specialists	26	3	5	0
ALL PHYSICIANS	25	8	22	46

<sup>a</sup>Rows sum to 100% by method of collapse (i.e., specialty adjusted vs. no specialty adjustment).

Source: South Carolina 1981 Medicare Part B Claims Data.

column compared to internists. The percentage of losing "other" medical specialists increases from 19 to 26 percent when visits are collapsed into five rather than two groups.

Recall from Table 5-13 that drastic changes occurred in total Medicare revenues for the specialty groups analyzed when reasonable charges were averaged across all physicians regardless of specialty. Table 5-14 indicates that it is not the case that a few medical specialists bear the financial burden, rather, the majority would suffer from drastic cuts in Medicare reimbursements. When visit categories are reduced to just two groups, we find 80 percent of internists and 87 percent of other medical specialists would be losers. GPs and FPs, on the other hand, are overwhelmingly the winners as their lower fees are averaged in with the higher ones for medical specialists. Even more medical specialists lose under the second package.

We must consider any changes in physician behavior once visits are collapsed, and whether these changes will affect the availability of care for Medicare patients. Can we expect the losers under either collapsed plan to stop taking assignment? It is hard to predict physician behavior without knowing how dependent they currently are on Medicare reimbursement for office visits. One important factor influencing behavior is the physician's current assignment rate (see Mitchell and Cromwell, 1982). Consider a losing physician; the lower his assignment rate, the less likely he is to continue taking patients on assignment. Conversely, we might expect winners to expand their Medicare caseloads, thus lessening the negative impact of losers dropping out of the program (or even increasing the availability of care to the elderly).

Table 5-15 presents assignment rates for the winners and losers of the two collapsed package approaches. In every case, the potential losers currently accept fewer visits on assignment relative to the non-losers. The number of assigned visits for losers represents less than one quarter of total assigned visits for all package versions, and even less of total Medicare visits. In the case of specialty-specific visit packages, the vast majority of assigned visits are provided by unaffected physicians, implying limited behavioral change. Packages without specialty distinction show slightly greater numbers of assigned visits by "losing" physicians, but many more winners are potentially available to offset any access problems..

Does anything happen to access of care in terms of assignment rates if the losers decide to no longer accept visits on assignment? Consider two (extreme) scenarios; the first in which losers no longer take any of their

TABLE 5-15

## SUPPLY OF ASSIGNED AND TOTAL MEDICARE OFFICE VISITS BY WINNERS AND LOSERS

	Assignment Rate ( $\bar{X}$ =37%)	Total Assigned Visits (N = 241,244)	Total Medicare Visits (N = 646,373)
<u>Collapsed Package #1</u>			
Specialty-Specific Fees-			
Losers	23%	33,979	144,622
No Change	40	157,597	394,617
Winners	46	49,668	107,134
Physician-Wide Fees			
Losers	21%	37,615	177,444
No Change	34	36,543	105,994
Winners	46	167,086	362,935
<u>Collapsed Package #2</u>			
Specialty-Specific Fees			
Losers	25%	29,517	119,242
No Change	40	184,592	462,919
Winners	42	27,135	64,212
Physician-Wide Fees			
Losers	25%	46,915	187,626
No Change	33	42,469	130,297
Winners	46	151,860	328,450

Source: South Carolina 1981 Medicare Part B Claims Data.

patients on assignment yet these patients continue to be treated by losing physicians; and the second scenario in which the losers drop out of the Medicare program (i.e., no longer take assignment) causing patients to shift en masse to winning physicians.

The impact of these two scenarios can be estimated by calculating assignment rates for all South Carolina physicians weighted by the percent of total visits for winners, losers, and those incurring no change. For example, from Table 5-15 we know that for the first collapsed package with specialty-specific fees, the losers, physicians with no change, and winners provided 17, 61 and 22 percent of total Medicare office visits, respectively. Taking a weighted average of their assignment rates produces an overall assignment rate of 37 percent ( $= .22(23\%) + .61(40\%) + .17(46\%)$ ), for South Carolina physicians.

In the first scenario, we assume the weights do not change as patients choose to continue to be treated by losing physicians, but the losers' assignment rate falls to zero. This results in the assignment rate for all physicians falling to 32 percent ( $= .22(0\%) + .61(40\%) + .17(46\%)$ ), a reduction of 5 points. If all the losers' assigned patients transferred to winning physicians (the second scenario), the total visit percentages for losers and winners switch to 17 and 22 percent, respectively. As a result, the assignment rate for South Carolina physicians providing office visits falls only two percentage points (from 37 to 35 percent).\* In this case, the impact of losers leaving the program is considerably offset. However, even if patients choose to stay in the care of losing physicians, the reduction in the overall number of assigned visits is fairly small.\*\*

To complete the analysis, we must also look at how collapsed packages could increase the financial burden placed on Medicare patients. Patients of physicians who do not accept assignment are expected to pay 100 percent of the physician's fee above the Medicare reasonable charge. For patients of losing physicians who choose to remain in their care after visits are no longer accepted on assignment, they must pay 100 percent of the physician's fee above

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\*The 2 percentage point decline is conservative (i.e., overstates the decline) as patients who switch are assumed to experience the average assignment rate of winning physicians, not the 100 percent assignment they had been enjoying under their previous physicians.

\*\*This is a phenomenon specific to the state of South Carolina. Similar analyses of claims data in other states could have produced much different (and more drastic) changes in the overall assignment rate.



the lower allowed charge plus the 20 percent copay. Then there are the patients of winning physicians who accept assignment who will be responsible for paying the 20 percent copay on a higher reasonable charge for a collapsed visit. Thus, collapsed packages will invariably raise the out-of-pocket burden to beneficiaries, depending on how sensitive they are to copays. If assigned patients of all losing physicians switch to winners, the burden would be minimal.

To summarize, we have learned three things from this simulation technique. First, the impact of allowing for specialty-specific fee screens is very important from the standpoint of physicians' earnings. If policymakers are to introduce collapsed packaging, the specialty-specific payment method would be more acceptable to physicians compared to the physician-wide fee screens which fall disproportionately on specialists. Second, the number of collapsed visit categories, two or five in our analysis, did not have significantly different effects on overall Medicare outlays or on physicians' earnings, though the coefficients of variation were considerably lower when five categories are used. And finally, collapsing office visit categories should not dramatically alter access to care (in terms of the number of assigned visits provided by physicians). If losers decide to no longer take patients on assignment, the overall assignment rate for all physicians in South Carolina would fall only slightly under reasonable assumptions.

#### 5.4 Summary and Conclusions

In sum, 13 diagnostic and surgical procedures and 11 different office visit categories have been examined in this chapter with the intent of reducing the number of profiles and billing detail required. Extensive fractionation in billing is obvious: 12 different CPT-4 codes for a diagnostic colonoscopy costing "only" \$250 (in South Carolina); 11 office visit categories across new and established patients.

#### Diagnostic and Surgical Collapsed Packages

Considering, first, the diagnostic/surgical procedures, we find that

- much of the subcode detail results from a nesting of strata reflecting the level of difficulty (e.g., a three artery bypass) and type of complementary procedure (e.g., with biopsy).

This nesting has a multiplicative effect on the number of codes and can lead to

- important deviations from marginal cost pricing rules.

Medicare in South Carolina, for example, pays about \$80 more for a biopsy done as part of a limited colonoscopy, but only \$15 more if done with a complicated one. These discrepancies are strictly a function of physician charge differentials and very likely do not reflect true "marginal procedure costs."

Another example of odd pricing policies occurs in expensive, rapidly proliferating, coronary bypass surgery. In South Carolina, and we have no reason to expect it to be different elsewhere,

- surgeons charge a very high fixed cost for performing a single bypass (\$2,700); then an extra \$400 per artery up to four; then only \$170 per artery beyond four. (The carrier, by the way, pays \$400 per extra artery only up to three; nothing thereafter.)

Lack of proven medical efficacy and cost-effectiveness of multiple bypass surgery raises serious questions about paying such "marginal costs," particularly when the pattern is so odd. Failure to pay anything for two or more bypasses would involve a basic Medicare coverage decision, which may or may not be appropriate. On the other hand, paying a "reasonable" marginal cost tied to complexity (say operating room time) would seem entirely appropriate, and may discourage unnecessarily complicated surgery.

Collapsing procedure subcodes can address this problem, as well as discouraging proinflation. Successful collapses should greatly reduce the coefficient of variation (C.V.), hence reflecting a fairly homogeneous set of activities. While variation will vary systematically by locality or state depending on the number of physicians and distinct markets, we can say that

- charge variation across subcodes is usually far less for surgical procedures (e.g. only 25% for all cholecystectomies with little reduction when fractionated).

By contrast,

- many small cost, diagnostic procedures exhibit large variation (e.g., C.V.s above 50%) due to the relatively key role complementary procedures play in the package.

One solution to this problem, which should work in some cases, would result in a partial collapse based on one of the strata (e.g., up to vs. beyond the splenic flexure).

A final problem with multi-procedure subcodes is the continued payment for outmoded technologies. At any one point in time, the diffusion of new technology will be incomplete. As a result, it is quite possible that

- Medicare could be paying more for an older, less cost-effective technology (e.g., a rigid vs. a flexible bronchoscope).

In those instances of equal outcomes, physicians ought to be held at least to the lower of the two prices. If using an outmoded technology takes more physician time, a sound argument could be made that the extra cost should be borne by the practitioner, not Medicare. By allowing for multiple technologies to accomplish essentially the same end, CPT-4 encourages irrational payment rates, inadvertently if not by design.

#### Office Visit Packages

In analyzing CPT-4 claims for office visits, we found that

- several of the 11 office visit codes exhibited very low frequency (less than 1%).

Moreover,

- many visit categories exhibited almost identical fees -- particularly for the same category (e.g., a brief visit) for new vs. established patients.

These two facts would suggest real opportunities for collapsing several visit types, especially across new vs. established patients.

We conducted a limited validity check of the codes for established patients and found

- prima facie consistency among codes: more complex visit descriptions show greater physician input, more ancillary procedures, and a poorer patient health status.

Still,

- physician and other inputs, and specialty explain less than 50 percent of the charge variation, which may be indicative of some procinflation.

Some physicians may be billing a true brief visit as an intermediate one, creating systematic error in the charges vs. input mix.

Another indication of possible procinflation was found through a comparison of GP and internist fees. While

- internists' office visit fees and payments were considerably higher than those of GPs,
- implicit hourly payment rates were identical by visit type across specialists and generalists.

From this, we cannot tell whether GP Medicare visit payments are too high or specialist payments too low. It is also possible, although we cannot tell for sure, that GPs are receiving comparable hourly rates to specialists' because they are exaggerating the complexity of their visit mix. Certainly,

- national data indicate that GPs spend much less time with patients than do internists for the same type of visit.

One more relevant finding for collapsed packages came from our validation study:

- implicit hourly wages for comprehensive visits were 40% greater than all other visit types, for all physicians, regardless of specialty.

If true, comprehensive visits must be regarded by physicians as more extensive, or complex, per minute of physician input, which suggests separate billing and payment.

Eleven office visits were collapsed into two packages, one for new vs. established patients, another allowing for 2-3 subcodes within each patient type.

- Variation was quite high for the new/established package (C.V.s = 60-70% by specialty), arguing against a visit package with such a simple stratification.
- Allowing for subcodes within the new/established stratum reduced variance considerably, but C.V.s were still 1/2 to 2/3 what they were originally.

Given the complete failure of the new vs. established distinction to explain variance,

- a third package suggested itself, based on the following trichotomous classification:
  - minimal, brief, and limited visits
  - intermediate and extended visits
  - comprehensive visits.

To avoid continued procinflation at the limit, however, very clear operational distinctions would have to be made.

An analysis of the distributional effects of paying on the two collapsed visit packages showed that

- the specialty distinction in payment is crucial to the mix of package "winners" and "losers"; without any distinction, 80-90% of specialists would lose under either package vs. only 25% losers with a specialty distinction.
- If all physician losers under each package refused assignment, the overall assignment rate in South Carolina would fall 5 points, from 37 to 32 percent. If all their patients then transferred to winning physicians, the rate would still fall but only a couple of points.

Naturally, the second finding is sensitive to the overall assignment rate. In states with high visit assignment rates, the effects could be greater.

The implication of collapsing for Medicare enrollees is clear in direction, but not size:

- the financial burden on patients would rise, both for previously assigned patients of losing physicians and for those of winning physicians, as they must now pay a 20 percent copay on a higher average charge. The net effect, however, crucially depends on how many enrollees transfer to winning physicians willing to take them on assignment. If most switched, the net financial burden could be quite low.

This brings us to the final point concerning Medicare's market power. Where its power is great, loss of assignment and higher enrollee out-of-pocket burden should be minimal. Again for South Carolina, we find

- considerable inequality in the distribution of office visits, with one-fifth of physicians providing one-half of all visits.

With inequalities like these, Medicare can exert considerable market power, for participating physicians cannot afford to lose 30-40 percent of their patients to package "winners." Whether this would happen depends on how sensitive enrollees would be to copays.

## 6.0 OFFICE VISIT PACKAGES

### 6.1 Overview and Research Questions

One of the major assumptions behind any packaging approach is that the package should include a bundle of medically meaningful procedures. Thus, we might package an ECG along with an office visit for chronic ischemic heart disease, but not with a well baby visit. Although physicians vary considerably in practice styles, medically meaningful packages should be more homogeneous and exhibit less variation in, say, resource use than packages that don't make medical sense. The more homogeneous the package, furthermore, the less likely it is that serious inequities will be introduced as a result.

Because of the tremendous variation in medical problems encountered in the office, some sort of casemix adjustment is necessary for office visit packages. The casemix measure used would define the actual packages for reimbursement purposes. Thus, referring to our previous example, a diagnosis-based approach might yield both a chronic ischemic heart disease package (which would include an ECG) and a well baby package (without an ECG).

In this chapter, we first explore the impact of several different casemix measures on office visit packages, using data from the National Ambulatory Medical Care Surveys (NAMCS). In particular, we examine the following questions:

- (1) Do casemix measures successfully "define" individual packages, or is there as much variation in resource use within packages as between?
- (2) Does one approach to casemix work better than another? If so, are there trade-offs with the feasibility of the packages? Some variance-minimizing casemix approaches may produce an unwieldy number of packages, for example.
- (3) Do some approaches result in a systematic over or underpayment of certain types of conditions or of visits provided by certain physician specialties?

Although the NAMCS data provide rich detail on the actual resources associated with an office visit (including physician time), they do not include information on physician charges. In order to examine the variation in office visit package prices, as well as to compare them with our other package approaches, we also constructed office visit packages from Medicare Part B claims. In that analysis, we ask:

- (4) How much of the variation in package price can be attributed to the fee for the office visits itself and how much to ancillary use?

- (5) Do the various specialties produce very different packages, in terms of their content, or are differences due solely to the fees they charge?

## 6.2 Impact of Casemix on Office Visit Packages

### 6.2.1 Approaches to Casemix Adjustment

Under an office visit packaging arrangement, reimbursement is made on a per visit basis, and the package includes all associated ancillary services (e.g., lab tests, x-rays, ECGs, injections, etc.). Unlike surgical operations which are discrete procedures and whose relative complexity can be easily captured by such measures as relative value scales, office visits tend to be much more heterogeneous. Specialists, for example, average more time with office patients and order more services per visit compared with GPs (Mitchell et al., 1983), differences that presumably reflect variations in casemix complexity. Even within specialty, physicians vary in the types of patient problems they treat. Taking these factors into consideration, it would seem desirable to construct office visit packages of varying complexity.

In our analysis of office visit packages, we compare three different approaches to casemix adjustment: (1) diagnosis/visit type; (2) reason for visit; and (3) ambulatory patient groups (APGs), an office visit analog to hospital DRGs.

Diagnosis/Visit Type: Here, the ICD-9 coding taxonomy provides the tool for grouping office visits into separate packages. The use of diagnostic classifications has an intuitive appeal; all patients with diagnosis X should receive a similar set of services, and hence incur similar costs. In addition, these ICD-9 codes are commonly used and understood by both physicians and insurers, thereby facilitating the acceptance of such an approach. We further distinguish between new and established patient visits, a distinction made by all procedural coding terminology systems, including CPT-4. Initial (new patient) visits usually entail more physician time and diagnostic testing than do follow-up (established patient) visits.

As there are potentially hundreds of diagnostic categories, a subset of 19 was chosen for investigation, and office visit packages constructed as shown in Table 6-1. In some instances, comparable diagnoses have been combined; thus the acute upper respiratory infection group includes not only the common cold but flu and acute bronchitis as well. These diagnoses were chosen because they are frequently seen in the physician's office and because they are representative of all age groups. Together, these 19 groups accounted for 37 percent of all office visits in 1979-1980.



TABLE 6-1

## DIAGNOSES USED TO TEST THE DIAGNOSIS/VISIT TYPE APPROACH TO CASEMIX ADJUSTMENT

Diagnosis	ICD-9 Code(s)	Percent of Office Visits
1. Essential benign hypertension	401.9	4.2%
2. Pregnancy	V22-V24	4.2
3. Acute upper respiratory infection (incl. acute bronchitis, flu)	079, 460, 465, 466, 487	3.7
4. Osteoarthritis (incl. Rheumatism)	715, 716, 725- 729	3.3
5. Well baby	V20	2.7
6. Acute pharyngitis, tonsillitis	034, 462, 463	2.4
7. Back problems (incl. sprains, strains, lumbago)	724 (except, 724.7), 846, 847	1.9
8. Contact dermatitis and eczema	380, 691, 692 696, 698	1.8
9. Otitis media	382	1.7
10. Diabetes mellitus	250	1.5
11. Chronic ischemic heart disease (incl. angina pectoris)	413, 414	1.5
12. Chronic bronchitis, emphysema	490, 491, 492.8, 496	1.4
13. Allergic rhinitis	477	1.3
14. Acne	706	1.1
15. Asthma	493	1.0
16. Gastroenteritis, gastritis, duodenitis	535, 558	0.9
17. Refraction disorders	367	0.9
18. Inflammatory disorders of female genitals	616	0.8
19. Cataract	366	0.5

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

Reason for Visit: This approach describes the justification, or reason, for initiating the visit and encompasses the clinical objectives and strategy anticipated by the physician. It is viewed by some as preferable to diagnosis for several reasons. First, the same diagnosis may imply very different clinical strategies and hence different levels of resource use: a hypertension patient in for a routine checkup, for example, may take less time and require fewer ancillary services than the chronic hypertension patient whose illness is no longer controlled by his medication and needs to be re-evaluated. Second, especially for initial (new patient) office visits, there may not even be a diagnosis.

Table 6-2 presents the Reason for Visit (RFV) categories developed by Dr. Hirsch as part of this project. In the first instance, the RFV classification is similar to procedural terminology such as CPT-4 in its distinction between initial (new patient) and return (established patient) visits. Initial visits are further categorized by their objectives: (1) a determination whether an illness exists; (2) a determination whether illness is acute (improvement expected) or chronic (long-term therapy needed); (3) the obtaining of specific preventive measures (e.g., immunization); (4) a determination of fitness or unfitness; and (5) counseling and advice. Return visits can be divided into those with new symptoms and no new symptoms. As the majority of all visits are return visits, further disaggregation is warranted, e.g., acute vs. chronic problem.

Ambulatory Patient Groups: In the past few years, there have been a variety of attempts to collapse and/or combine the ICD-9 codes into casemix categories which represent homogeneous medical management and resource consumption patterns. Probably the best known approach is Diagnosis-Related Groups (DRGs), designed to group clinically similar hospital patients based on length of stay differences. The same research group at Yale University (Fetter et al., 1980) has also developed a similar classification systems for office visits, known as Ambulatory Patient Related Groups (APGs). First, all visits were classified into 14 major diagnostic groups based on organ system. Then, using the AUTOGRP clustering algorithm, a total of 154 APGs were created that minimized length of visit differences. Variables used in the clustering process included presenting problem, reason for visit, primary diagnosis, presence or absence of a secondary diagnosis, visit type, and age. This approach explicitly recognizes that older patients or patients with multiple problems may be more difficult to treat than other patients with the same diagnosis.

TABLE 6-2

## REASON FOR VISIT (RFV) APPROACH TO CASEMIX ADJUSTMENT

RFV Category	Description	Percent of Office Visits
<u>Initial Visits</u>		
( 1) Acute Episode	visit is for newly developed complaint, such as flu, which is self-limiting and amenable to treatment.	8.7%
( 2) Chronic Illness	visit is for known pre-existing condition, such as diabetes or hypertension.	3.8
( 3) Preventive Service	visit is for routine exam, or protection against specific diseases (e.g., immunization).	2.3
( 4) Consultation	one time visit for consultation, after which patient returns to referring physician.	0.4
( 5) Administrative	visit is evaluative in nature, providing certification of health or illness (for school, employment).	0.8
( 6) Counseling	patient seeks advice on personal matter.	0.0
<u>Return Visits - New Symptoms</u>		
( 7) Acute Episode	return visit for treatment of new problem of an acute nature, such as tonsillitis	16.1
( 8) Chronic Illness	return visit for identification and treatment of a new, chronic problem, e.g., emphysema.	2.2
( 9) Post-surgery	return visit to regular physician for post-surgery follow-up visit.	1.3
(10) Non-illness	return visit for diagnosis and/or therapeutic services for new condition (e.g., initial pregnancy visit).	3.0
<u>Return Visits - No New Symptoms</u>		
(11) Interim Management of Acute Illness	return visit for follow-up care of acute illness	11.2
(12) Interim Management of Chronic Illness	return visit for maintenance of chronic problem	30.6
(13) Post-surgery	return visit for post-surgery observation and follow-up.	8.3
(14) Non-illness	return visit for routine care (e.g., well baby exam, pre-natal care).	11.3

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

Table 6-3 presents an example of some of the Ambulatory Patient Groups (APGs) for heart disease. There are actually 20 APGs for disorders of the circulatory system. We present only the 14 that could include patients with hypertension, one of the tracer diagnoses we are examining in our "diagnosis/visit type" casemix approach. (The six omitted APGs include as a criterion variable a primary diagnosis other than hypertension.) Although there are many fewer APGs than DRGs (154 vs 467 revised DRGs), it is obvious from Table 6-3 that at least as much information is needed to construct an APG as a DRG.

The actual number of office visit packages used for reimbursement purposes obviously will vary as a function of the casemix method used. This would range from 14 packages using the Reason for Visit approach to 154 for the Ambulatory Patient Group approach to (potentially) hundreds with the diagnosis/visit type method. (Of course, many physicians would use only a subset of the APG or diagnosis-based packages, but the absolute number could still be quite large.) As CPT-4 includes 11 codes for office visits, going to a casemix-stratified visit package would appear to be exacerbating the problem of fractionated billing, but not necessarily. It is important to distinguish the impact that office visit packages would have on the procedure coding manual vs. their impact on the billing process. Although APG-based office visit packages, for example, would replace 11 CPT visit codes with 154 package codes, they would eliminate the simultaneous coding of the hundreds of different kinds of ancillary procedures. (The ancillary codes themselves, however, would have to be retained in the manual for non-packaged care.) Most important, only one bill from one provider (the package itself) would be processed by the insurer, rather than multiple bills from multiple providers.

#### 6.2.2 Data Source and Methods

The National Ambulatory Medical Care (NAMC) Surveys conducted by the National Center for Health Statistics provided an excellent data base for examining the resources associated with different types of packages. They are unique in containing not only visit characteristics, such as visit length and use of ancillaries, but patient casemix information as well. Each survey, conducted annually, is a nationally representative sample of office-based physicians, including both MDs and DOs. Physicians were asked to complete a questionnaire on a systematic random sample of visits over the course of a one week period. Our analysis of alternative casemix adjustments for office visit packages is based on two NAMC surveys: 1979 and 1980. Together, they provide

TABLE 6-3  
 AMBULATORY PATIENT GROUP (APG) APPROACH TO CASEMIX ADJUSTMENT:  
 EXAMPLE OF HEART DISEASE

APG	Description	Percent of Office Visits
GROUP 1	New patient, who was not referred, with a presenting problem of shortness of breath, chest pain or heart murmur.	0.04%
GROUP 2	New patient, who was not referred, without a presenting problem of shortness of breath, chest pain or heart murmur, and with a diagnosis of hypertension.	0.22
GROUP 3	New patient, who was referred, with a presenting problem of shortness of breath, chest pain or heart murmur.	0.04
GROUP 4	New patient, who was referred, with other presenting problems.	0.23
GROUP 5	Revisit for an old problem, without a periodic exam, who was not referred, with a presenting problem of chest pain, and with a diagnosis of hypertension.	3.53
GROUP 6	Revisit for an old problem, without a periodic exam, who was not referred, with a presenting problem of chest pain, with a secondary diagnosis.	0.15
GROUP 7	Revisit for an old problem, without a periodic exam, who was not referred, with a presenting problem of chest pain, with a secondary diagnosis.	0.24
GROUP 8	Revisit for an old problem, without a periodic exam, who was referred.	0.0
GROUP 9	Revisit for an old problem, receiving a periodic exam.	1.01
GROUP 10	Revisit for a new problem, without a periodic exam, who was not referred, without a presenting problem of chest pain, without a secondary diagnosis.	0.16
GROUP 11	Revisit for a new problem, without a periodic exam, who was not referred, with a presenting problem of chest pain, with a secondary diagnosis.	0.04
GROUP 12	Revisit for a new problem, without a periodic exam, who was not referred, with a presenting problem of chest pain, with a secondary diagnosis.	0.03
GROUP 13	Revisit for a new problem, without a periodic exam, and who was referred.	0.04
GROUP 14	Revisit for a new problem, receiving a periodic exam.	0.04

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

information on 91,432 unique patient visits in about 4,000 physicians' practices. The survey is discussed in more detail in Chapter 4.

Although the NAMC surveys provide very detailed information on the content of physicians' office visits, they do not allow us to make simple comparisons of resource use across diagnostic groups, Reason for Visit categories, or Ambulatory Patient Groups (APGs). We have no way of determining, for example, whether a ten-minute hypertension visit including one ECG is more or less resource-intensive than a twenty minute allergic rhinitis visit including lab tests. In order to make such comparisons, we have constructed a summary "intensity index," which attempts to capture the two basic components of physician office visits: 1) the amount of time the physician spends with each patient (i.e., direct physician input), and 2) the utilization of ancillary services, both for diagnostic and therapeutic purposes. The intensity index is a weighted average of these components, using relative prices as weights. The index was then standardized, so that the intensity of the average office visits in the U.S. was equal to 1.0. A detailed description of how the index was constructed can be found in Appendix A.

### 6.2.3 A Diagnosis-Based Approach to Packaging

#### Within Package Variation in Resource Use

The notion of a diagnosis-based approach to packaging physician services is certainly intuitively appealing, i.e., one would expect a hypertension patient to receive a very different bundle of services than, say, a hepatitis patient. Table 6-4 presents the intensity index and its coefficient of variation for each of the 19 diagnoses. Recall that the intensity index,  $I$ , varies around the value one, with one representing average resource use. A visit for chronic ischemic heart disease ( $I=1.24$ ) would thus be more resource-intensive than the "average" visit, while an otitis media visit would be considerably less so ( $I=0.55$ ). The coefficient of variation, or C.V. as it is called, provides a summary standardized measure of a population's dispersion about its mean; because it is unitless, it can be used to directly compare diagnoses with very different intensity indices. (Technically, the C.V. is equal to a variable's standard deviation divided by its mean, and is expressed as a percent.)

As seen in Table 6-4, there is tremendous variation in visit intensity across diagnostic groups. A hypertension patient, for example, consumes about 25 percent more resources than a patient coming in with the flu, as evidenced

TABLE 6-4

INTENSITY INDEX BY DIAGNOSIS AND VISIT TYPE<sup>a</sup>

Diagnosis	All Visits	New Problem	Old Problem
1. Hypertension	0.86 (99)	1.43 (90)	0.80 (97)
2. Diabetes mellitus	0.99 (81)	1.44 (83)	0.94 (77)
3. Chronic ischemic heart disease	1.24 (89)	2.32 (67)	1.10 (86)
4. Acute URI	0.64 (78)	0.67 (81)	0.60 (67)
5. Otitis media	0.55 (71)	0.56 (72)	0.53 (69)
6. Acute pharyngitis, tonsillitis	0.61 (61)	0.61 (59)	0.61 (64)
7. Asthma	0.68 (123)	1.26 (108)	0.55 (110)
8. Chronic bronchitis, emphysema	0.88 (90)	0.90 (93)	0.87 (87)
9. Osteoarthritis, rheumatism	1.03 (78)	1.25 (72)	0.90 (78)
10. Back problems	1.00 (71)	1.21 (62)	0.85 (74)
11. Pregnancy	0.66 (69)	1.01 (54)	0.59 (66)
12. Well baby	0.82 (76)	0.83 (75)	0.82 (77)
13. Allergic rhinitis	0.41 (160)	1.01 (88)	0.30 (174)
14. Refraction disorders	1.84 (46)	1.83 (39)	1.84 (52)
15. Contact dermatitis	0.72 (74)	0.74 (73)	0.71 (77)
16. Acne	0.92 (75)	1.09 (67)	0.86 (77)
17. Gastroenteritis	0.82 (85)	0.80 (87)	0.85 (82)
18. Inflammatory disorders of female genitals	0.97 (55)	0.98 (53)	0.95 (57)
19. Cataract	1.63 (41)	1.75 (35)	1.58 (44)

<sup>a</sup>Coefficients of variation are in parentheses.

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

by average intensity indices of 0.86 and 0.64, respectively. Similarly, an otitis media patient is treated with less than half the intensity devoted to a heart disease patient.

Although we might expect patients with the same diagnosis to receive a similar set of services, Table 6-4 indicates that this is not necessarily so. The large coefficients of variation for the intensity indices suggest that there is tremendous variation in resource use even within narrowly defined diagnostic packages. These differences are most pronounced in the treatment of asthma and allergic rhinitis, but are evident in the other diagnoses as well. The relative contributions of visit length and ancillary use may partially explain this variability. Physician time input represents a larger proportion of the intensity index for asthma and rhinitis (about 85%) for example, while diagnostic packages with much smaller C.V.s, such as cataracts and refraction disorders, are relatively less time-dependent. In these latter instances, visit length and ancillary use both constitute about 50 percent of the index.

One reason why we might be observing such dramatic differences in the treatment of a particular diagnosis is that both initial and follow-up visits are included in our diagnostic groups, even though the two have very different implications for resource use. The initial detection of a disease should require notably more physician input and ancillary testing than the treatment of a previously identified illness, ceteris paribus. To adjust for this potential source of variation, our diagnostic categories have been further disaggregated by "visit type," i.e., old vs. new problem (see Table 6-4).\*

As hypothesized, visits for new problems are considerably more intensive than return visits for old problems, at least for the chronic illnesses (e.g., hypertension, diabetes). There are few differences in office visit intensity by visit type for acute care, presumably because each episode of an acute illness is treated as a "new" problem, even though it may be an "old" patient. (A child seeing his pediatrician for a third bout of otitis media should not be treated much differently than one who has never contracted the disease, for example.)

While distinguishing by visit type reduces the variation in medical management for some diagnoses (e.g., hypertension, heart disease, asthma), considerable variation still remains. It may be that the variation in

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\*Both new patients and established patients with new problems are included in this group since both presumably require more resources than established patients with formerly identified problems.



treatment regimens is rather a function of specialty; allergists' treatment of allergic rhinitis may differ radically (both in content and in intensity) from that of GPs, for instance, but not from each other. To explore this possibility, we selected one chronic and one acute illness and compared the actual bundle of services provided by the specialties treating each disorder.

Table 6-5 and 6-6 present treatment patterns for hypertension and otitis media, respectively, by specialty and visit type.\* The intensity index is also provided (at bottom) as a summary measure. As we might expect, there are some very notable differences in the treatment of these illnesses, particularly hypertension, by specialty. Cardiologists, for instance, spend almost twice as long with their new hypertension cases, and order significantly more of all types of ancillaries, than do GPs. Of course, part of this variation may be attributable to legitimate differences in casemix; cardiologists may not only handle hypertension cases differently than GPs, but may also be seeing a much sicker patient. If this is the case, however, it is not reflected here, as there are no real differences across specialties in the proportion of elderly patients or of patients with a second diagnosis.

Although patterns of treatment clearly vary by specialty, does adjusting for specialty significantly reduce the within-package variation in office visits? Based on the coefficients of variation for the intensity index, the answer appears to be a qualified "no". In a few instances, such as new hypertension visits to cardiologists, or new otitis media visits to otolaryngologists, variation is lessened by controlling for specialty. But both of these examples represent a fairly small proportion of all visits. For the specialties providing the bulk of otitis media and hypertension care, i.e., GPs, pediatricians, and internists, making such an adjustment has little overall effect on reducing variation.\*\*

#### Explaining Within-Diagnosis Variation in the Intensity Index

Although resource use clearly varies with diagnosis, visit type, and specialty, we observe considerable variation in treatment patterns even holding these factors constant. Yet for packaging purposes, it is important that we minimize at least that variation attributable to legitimate casemix

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\*For simplicity of presentation, only the most frequently performed services for each diagnostic group have been included.

\*\*Similar analyses performed on the other 17 diagnostic tracers yielded comparable results (not shown).

TABLE 6-5

## VARIATIONS IN PATTERNS OF CARE FOR HYPERTENSION BY VISIT TYPE AND SPECIALTY

	GP		Internal Medicine		Cardiology	
	Old problem	New problem	Old problem	New problem	Old problem	New problem
<u>Patient Characteristics</u>						
% Elderly	45.48	39.28	42.48	40.08	45.28	36.98
% with Second Diagnosis	42.9	43.5	49.3	48.9	55.6	47.1
<u>Diagnostic Services<sup>a</sup></u>						
Limited Exam	63.3	59.7	62.9	41.5	56.1	27.6
General Exam	9.2	26.9	15.6	51.3	21.6	49.5
Lab Test	18.5	23.5	25.0	51.6	23.3	37.1
X-ray	1.6	9.5	7.6	26.3	13.6	38.4
Blood Pressure Check	88.4	82.9	82.5	79.8	93.4	83.4
EKG	2.9	9.2	10.8	36.1	19.0	54.0
<u>Therapeutic Services<sup>a</sup></u>						
Drugs <sup>b</sup>	90.0	81.6	88.0	74.5	88.9	55.2
Medical Counseling	24.2	30.9	29.4	33.1	25.3	67.6
Diet Counseling	17.0	23.5	17.1	23.2	21.2	24.1
<u>Length of Visit</u>	12.0 (53) <sup>c</sup>	16.2 (57)	17.3 (66)	27.1 (66)	19.6 (67)	34.8 (70)
<u>Intensity Index</u>	0.65 (86)	1.03 (91)	1.03 (88)	2.00 (70)	1.30 (84)	2.60 (54)

<sup>a</sup>Percent of patients for whom service is ordered.

<sup>b</sup>1980 only; includes both injections and written prescriptions.

<sup>c</sup>Coefficients of variation are in parentheses.

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

TABLE 6-6

## VARIATIONS IN PATTERNS OF CARE FOR OTITIS MEDIA BY VISIT TYPE AND SPECIALTY

	GP		Otolaryngology		Pediatrics	
	Old problem	New problem	Old problem	New problem	Old problem	New problem
<u>Patient Characteristics</u>						
% Under 14 years	66.4%	55.5%	39.3%	33.6%	99.0%	95.3%
% with Second Diagnosis	29.2	39.4	20.3	30.9	29.0	27.3
<u>Diagnostic Services<sup>a</sup></u>						
Limited Exam	84.0	91.4	97.6	85.2	81.9	76.5
General Exam	6.5	6.9	1.4	14.8	12.7	19.9
Lab Test	4.9	17.5	2.1	3.8	9.7	10.4
Check Blood Pressure	19.7	22.7	0.0	0.0	2.4	0.7
<u>Therapeutic Services<sup>a</sup></u>						
Prescription Drugs <sup>b</sup>	72.9	97.4	52.4	86.3	65.9	92.4
Injections <sup>b</sup>	19.9	28.5	0.0	0.0	7.3	18.4
Office Surgery	4.3	2.6	13.5	7.2	1.7	2.7
Medical Counseling	14.9	16.6	27.2	29.5	19.3	24.0
<u>Length of Visit</u>						
	9.9 (61) <sup>c</sup>	9.7 (53)	13.1 (55)	13.9 (39)	10.1 (54)	11.4 (66)
<u>Intensity Index</u>						
	0.53 (83)	0.55 (85)	0.70 (62)	0.70 (38)	0.49 (64)	0.55 (70)

<sup>a</sup>Percent of patients for whom service was ordered.

<sup>b</sup>1979 only.

<sup>c</sup>Coefficients of variation are in parentheses.

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

differences. In this section, we use regression analysis to determine how much of the variation in visit intensity can be explained by patient characteristics, and how much by other factors, such as physician specialty and geographic location.

Table 6-7 summarizes the percent of variation in the treatment of each of the 19 diagnoses attributable to patient and physician characteristics, and location. (Rows sum across to yield total explained variation based on corrected R-squares.) Although the regression specifications varied somewhat by diagnosis,\* patient characteristics include demographics (age, sex, race), severity of illness (indicated by presence of second diagnosis) and reason for visit (e.g., acute, chronic, or nonillness care; new or old problem); physician characteristics include specialty and whether a physician is an MD or DO; and practice location includes region of the country and SMSA-nonSMSA.

The most striking thing about the equations summarized in Table 6-7 is their inability to explain very much of the variation in resource use in the treatment of any one diagnosis. At best, these factors are able to explain one quarter of the variation in resource intensity and usually considerably less. Patient characteristics (proxying health status and illness severity) were the best predictors of visit intensity, while specialty and location played a much smaller, often negligible, role. In general, the explanatory power of the equations was better for chronic than for acute illnesses, although in no instance were we able to account for a very substantial proportion of the variation in the intensity index.

To take a closer look at the relationship between certain patient and physician characteristics and office visit intensity, we calculated the predicted value of the intensity index for several different "types" of patients/visits (see Table 6-8). The first row in Table 6-8 shows the average intensity of an office visit for the average hypertension and otitis media patient, respectively. Each of the following rows should be compared with these means, e.g., being an elderly hypertension patient lowers the index from 0.86 to 0.82.\*\*

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\*For certain diagnoses, some variables were either totally inappropriate or required a slightly different specification. Patient sex, for example, was not included in the pregnancy regression.

\*\*Although being elderly generally implies poorer health status, ceteris paribus, the elderly may also see their physician more frequently, suggesting that each visit be less intensive on average. In other regressions for diagnoses also common to the elderly (e.g., diabetes, heart disease), this variable was generally insignificant. For acute illnesses, however, as in otitis media also shown on Table 6-8, being 65 years or older raised average intensity.

TABLE 6-7

PERCENT OF VARIATION IN INTENSITY INDEX EXPLAINED BY PATIENT AND PHYSICIAN CHARACTERISTICS, AND PRACTICE LOCATION

Tracer Diagnosis	Patient Characteristics	Physician Characteristics	Physician Location	Total <sup>a</sup>
1. Hypertension	14.3%	5.2%	1.2%	20.7%
2. Diabetes mellitus	8.2	2.5	1.5	12.2
3. Chronic ischemic heart disease	15.9	5.6	1.7	23.2
4. Acute URI	5.0	2.2	0.4	7.6
5. Otitis media	10.2	0.7	0.5	11.4
6. Acute pharyngitis, tonsillitis	5.7	2.0	0.2	7.9
7. Asthma	22.9	0.9	1.1	24.9
8. Chronic bronchitis, emphysema	9.2	5.0	3.4	17.6
9. Osteoarthritis, rheumatism	10.7	3.1	0.6	14.4
10. Back problems	10.5	1.5	1.4	13.4
11. Pregnancy	13.0	0.1	0.8	13.9
12. Well baby	2.0	1.9	2.4	6.3
13. Allergic rhinitis	23.7	0.2	0.8	24.8
14. Refraction disorders	4.7	1.0	8.2	13.9
15. Contact dermatitis	6.7	2.4	0.8	9.9
16. Acne	4.0	0.7	1.0	5.7
17. Gastroenteritis	13.3	4.6	1.0	18.9
18. Inflammatory disorders of female genitals	0.3	0.2	0.6	1.1
19. Cataract	6.9	4.0	-0.5	10.4

<sup>a</sup>Rows may not add up due to rounding.

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

TABLE 6-8

IMPACTS OF VARIOUS PATIENT AND VISIT CHARACTERISTICS ON THE INTENSITY INDEX FOR HYPERTENSION AND OTITIS MEDIA<sup>a</sup>

	<u>Intensity Index</u>	
	Hypertension	Otitis Media
Average patient	0.86	0.55
Elderly patient	0.82	0.74
Initial Visit	1.27	0.58
Routine exam	1.08	0.82
Presence of second diagnosis	0.97-1.20	0.63-0.80
Specialist care	0.96-1.50	0.58-0.69
Acute problem	1.05	0.55 <sup>b</sup>
Chronic problem, flare-up	1.00	0.60 <sup>b</sup>
Non-illness care	1.53	0.59 <sup>b</sup>

<sup>a</sup>Based on OLS regression analysis.

<sup>b</sup>Variable not significant.

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

Not surprisingly, the intensity index for our chronic disease, hypertension, is much more sensitive to patient/visit characteristics than is the index for otitis media. (Recall that these variables, among others, explained about 21% of the total variation in hypertension visits vs. only 12% for otitis media.) Hypertension patients visiting the physician for the first time, for instance, consume about fifty percent more resources than the average hypertension patient (1.27 versus 0.86). Patients with a second diagnosis also consume more resources; their intensity index ranges from 0.97 to 1.20, depending on the nature of the other diagnosis. Although patients with acute cases of hypertension or with flare-ups of a chronic case also have visits of above average intensity, the most intensive hypertension visits, however, are those for non-illness care. These patients presumably are coming to the office for their annual physical exam (including a fairly complete diagnostic workup).

Patient and visit characteristics generally have a much smaller influence on the treatment of otitis media. It is interesting to note that new patients, for example, do not have much higher resource use than the average otitis media patient, supporting our hypothesis that each episode of an acute illness is treated as a new problem. Nor is specialist care necessarily resource-intensive; although the intensity index for otitis media is higher for specialists than for GPs, the differences are relatively small (raising visit intensity between 0.03 and 0.14 points).

#### 6.2.4 A Reason for Visit (RFV) Approach to Packaging

##### Within Package Variation

The Reason for Visit (RFV) approach to packaging office visits developed by Dr. Hirsch for this project has one clear advantage over a diagnosis-based approach: there are only fourteen RFV categories compared with potentially hundreds of diagnostic groups. Yet can such a general classification scheme yield groups which are similar in terms of ancillary intensity and physician input? Table 6-9 presents the intensity index and its coefficient of variation by Reason for Visit category. Consistent with earlier findings, initial visits are by far the most intensive; here, physicians are both spending more time with patients and providing many more diagnostic services. Patients returning to their regular physician with new symptoms consume fewer resources than new patients, but more than those returning for treatment of a previously identified problem.

TABLE 6-9

INTENSITY INDEX BY REASON FOR VISIT CATEGORY<sup>a</sup>

RFV Category	Intensity Index
<u>Initial Visits</u>	
1) Acute Illness	1.22 (75)
2) Chronic Illness	1.49 (69)
3) Preventive Care	1.36 (75)
4) Consultation	1.97 (63)
5) Administrative Visit	1.43 (70)
6) Counseling <sup>b</sup>	--
<u>Return Visits - New Symptoms</u>	
7) Acute Illness	0.86 (77)
8) Chronic Illness	1.06 (75)
9) Post-surgical Care	1.11 (62)
10) Non-illness Care	1.09 (86)
<u>Return Visits - No New Symptoms</u>	
11) Interim Management of Acute Illness	0.89 (77)
12) Interim Management of Chronic Illness	0.85 (84)
13) Post-surgical Care	0.97 (72)
14) Non-illness Care	0.94 (100)

<sup>a</sup>Coefficients of variation are in parentheses.

<sup>b</sup>No visits from the 1979-1980 NAMC surveys fell into this RFV category (see Table 6-2).

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.



The coefficients of variation in Table 6-9 indicate that visit intensity does vary considerably within the RFV groups. Yet given that each RFV category is comprised of such a heterogeneous set of office visits, cutting across many diagnoses, specialties, and types of patients, it is noteworthy that a Reason for Visit approach to packaging seems to yield no more within-group variation than a diagnostic approach.

From a reimbursement perspective, the sheer simplicity of the RFV typology makes it a very attractive approach to packaging. The trade-off with simplicity, however, is the combination of many highly diverse types of office visits into a single RFV category. Exacerbating this problem is the fact that office visits are not evenly distributed across Reason for Visit categories (refer to Table 6-2), but rather are disproportionately represented in a few large groups; RFV7 and RFV12, for example, account for 47 percent of all office visits.

To illustrate this diversity, let us consider the largest RFV category, representing almost one-third of all visits: the interim management of chronic illnesses for "old" patients (RFV12). Within this RFV, we would find a wide range of patients, and an even wider range of diagnoses, all having very different implications for resource use. Both chronic ischemic heart disease (CIHD) and asthma patients would be in this group, for instance. Recall from Table 6-4 (column 3) that the intensity index for each of these diagnoses, respectively, was 1.10 and 0.55 -- a two-fold difference. An average payment for this RFV package would result in a large loss for CIHD visits and a windfall gain for asthma visits. This approach could lead to substantial inequities by specialty.

#### 6.2.5 An Ambulatory Patient Group (APG) Approach to Packaging

##### Within Package Variation in Resource Use

The final type of office visit packages we consider are those based on the ambulatory patient groups (APGs) developed by Fetter, et al. (1980). As a reminder, the APG typology first classified visits by major organ system, then used a clustering algorithm to form groups which minimized differences in visit length. Variables used in the clustering process included presenting problem, diagnosis, reason for visit, presence or absence of a comorbidity, age, and visit type.

Table 6-10 presents the intensity index and average length of visit by Ambulatory Patient Group for diseases of the circulatory system. Although

TABLE 6-10

INTENSITY INDEX AND LENGTH OF VISIT BY AMBULATORY PATIENT GROUP -- CIRCULATORY SYSTEM<sup>a</sup>

	<u>Intensity Index</u>	<u>Length Of Visit</u>
<u>New Patient</u>		
1) Not referred, with shortness of breath, chest pain, or heart murmur	2.97 (60)	35.6 (66)
2) Not referred, without shortness of breath, chest pain, or heart murmur, with high blood pressure	1.55 (81)	22.3 (60)
3) Referred, with shortness of breath, chest pain, or heart murmur	2.46 (50)	33.6 (56)
4) Referred, without shortness of breath, chest pain, or heart murmur	1.90 (57)	28.5 (53)
<u>Revisit for Old Problem</u>		
5) No exam, not referred, without chest pain, with high blood pressure	0.77 (86)	13.7 (60)
6) No exam, not referred, with chest pain, without second diagnosis	1.19 (75)	17.2 (51)
7) No exam, not referred, with chest pain, with second diagnosis	1.28 (66)	17.5 (50)
8) No exam, referred <sup>b</sup>	--	--
9) Exam	1.21 (100)	17.5 (71)
<u>Revisit for New Problem</u>		
10) No exam, not referred, without chest pain, with high blood pressure	1.02 (91)	15.9 (65)
11) No exam, not referred, with chest pain, without second diagnosis	1.77 (73)	18.4 (80)
12) No exam, not referred, with chest pain, with second diagnosis	1.91 (42)	19.6 (40)
13) No exam, referred	1.48 (81)	19.2 (57)
14) Exam	2.53 (56)	28.8 (61)

<sup>a</sup>Coefficients of variation are in parentheses.

<sup>b</sup>No visits from the 1979-1980 NAMC surveys fell into this group.

Source: National Ambulatory Medical Care Surveys (NAMCS), 1979-80.

there are actually twenty APGs for the circulatory system, we show only the 14 which potentially include hypertension cases, one of the diagnoses we've been following throughout this analysis. Perhaps the first point worth noting about Table 6-10 is the high level of resource use associated with nearly all circulatory visits; only return visits for the periodic maintenance of hypertension (APG 5) are below average intensity. Intensity indices for the other APGs are generally far above the norm; visits included in APG 1, for instance, have three times the resource utilization of the "average" office visit. As seen in the table, longer than average visits for cardiac patients are clearly part, but not all, of the reason for such high intensity indices (average visit length nationwide is 15.1 minutes); the remainder is due to greater ancillary utilization.

Although the Ambulatory Patient Group packaging approach takes both diagnosis and reason for visit into account, there is still substantial variation in visit intensity within office visit packages. In fact, coefficients of variation for the APGs are not appreciably smaller than those for the other types of office visit packages (adjusted for Reason for Visit or diagnosis), even though APGs were developed expressly for the purpose of defining homogeneous patient groups. Of course, the APGs were constructed to minimize variation in visit length rather than total resource use (proxied by the intensity index), but these two measures should be highly correlated, given the strong role played by visit length in determining the value of the intensity index. Furthermore, while the coefficients of variation for lengths of visit are often smaller than those for the intensity index, they still show considerable intra-package variation.

Perhaps a reasonable question to pose at this point is, "How well do the Ambulatory Patient Groups minimize variation in resource use relative to the other casemix approaches?" We saw earlier in this chapter that even holding patient and physician characteristics constant, over three quarters of the variation in visit intensity for any particular diagnosis could not be explained. Can the APG approach do any better? To test this hypothesis, we regressed the intensity index for three diagnoses (hypertension, otitis media and diabetes) on the APGs pertaining to their respective organ systems (i.e., circulatory disorders, ear disorders, and endocrine and metabolic disorders). The corrected R-squares for these regressions were 0.08, 0.002, and 0.08, respectively, suggesting that no more than eight percent of variation in the intensity index can be captured by the APGs. (As in our earlier work, the Ambulatory Patient Group approach was least successful in explaining

variations in resource use for otitis media, the only acute illness considered here.)

### 6.3 Package Pricing for Office Visits

From the preceding discussion, we've seen that there is tremendous variation in office visit resource use, as measured by our intensity index, even within-diagnosis. Although the index should be correlated with total package charges, it may actually underestimate within-package variation for two reasons. First, the index captures length of visit without any adjustment for differential valuation of that time (e.g., as a function of physician characteristics, location, etc.). Second, it measures only whether or not a given ancillary service was provided, and not the number of services. In order to examine this directly, we analyze diagnosis-based office visit packages based on claims data. Using claims data, we can also examine the reasons for the variation more closely. Any price differential by specialty that we observe, for example, can be evaluated in terms of how much is a result of fee differences across specialties and how much is due to the differential use of inputs by specialties.

We will address the following questions:

- (1) What is the mix and frequency of services associated with an office visit package? What share of all services is provided by the package physician?
- (2) What effect does specialty have on the package price? How much of the effect is the result of variation in fees and how much is a result of the intensity of services provided? For example, how does a follow-up visit to a general practitioner for hypertension vary from a visit to an internist for the same condition?
- (3) What effect do visit characteristics have on the package price? How does the package price for a new patient differ from that of an established patient? How do specialties differ in the way that they treat new patients? Do some specialties use more ancillaries in diagnosing a new patient?
- (4) What are the effects of locality on the package price for an office visit? How much of the differential in package price between urban and rural locations is due to price and how much is due to the intensity of services provided?

For this analysis, we have selected two chronic conditions commonly found in the Medicare population: essential benign hypertension and diabetes mellitus.

### 6.3.1 Constructing the Office Visit Packages

Using 1981 Michigan Medicare Part B claims data, the office visit package was created by selecting those services provided during the visit which are directly related to the care of the condition. For hypertension, this care includes: (1) diagnosis of the cause of the hypertension; (2) monitoring the effects of the treatment especially on the blood, kidneys and heart; and (3) attending to other cardiovascular risk factors. For diabetes, the care includes: (1) monitoring the effects of the treatment; and (2) attending to the cardiovascular risk factors. The packages include fees for related services provided on the same day as the visit (e.g., injections). Also included are fees for ECGs, x-rays, and laboratory services provided by a hospital outpatient department or an independent laboratory within five days of the visit and presumed to have been ordered at the time of the visit. The physician providing the visit is termed the "package physician" although services by other providers are included in the package price.

### 6.3.2 Variation in Charges and Intensity by Medical Condition

Table 6-11 shows the physician charges and inputs associated with office visit packages for hypertension and diabetes. The total package price is a weighted sum of physician charges for the visit components with their relative frequencies shown in parentheses. All patients had an office visit by definition but only four percent received an FCG, for example.

Packaged charges for a visit for hypertension averaged \$27.13. The range of the package price, however, is very large with a coefficient of variation of 150 percent. The package price for a diabetes visit was \$26.92 with a coefficient of variation of 116 percent. For both packages, the charge for the visit accounts for 57 percent of the total package price with use of ancillaries accounting for the remainder. In both cases, nearly all of the charges have been billed by the package physician; only one percent is attributable to independent labs or other providers. From this table, it is apparent that the office visit package for the two procedures are nearly identical. For this reason, we limit the discussion that follows to the hypertension package. Comparable tables for diabetes office visit packages can be found in Appendix B 6.

TABLE 6-11

OFFICE VISIT PACKAGES: HYPERTENSION AND DIABETES<sup>a</sup>

	Hypertension N = 19,506	Diabetes N = 6,752
Office Visit	\$15.49 (1.00)	\$15.14 (1.00)
X-rays	29.88 (0.04)	27.21 (0.03)
ECGs	30.71 (0.04)	28.65 (0.04)
Injections	6.14 (0.09)	5.00 (0.07)
Laboratory Tests	47.69 (0.18)	24.43 (0.37)
-----		
Total Package Price (package physician)	\$26.19	\$26.11
Coefficient of Variation	150.3%	115.3%
-----		
Total Package Price	\$27.13	\$26.92
Coefficient of Variation	149.7%	116.0%
-----		
Percent of All Charges from Package Physician	98.4%	98.6%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Part B Medicare Claims Data.

### 6.3.3 Variation in Charges and Intensity by Specialty and Geographic Location

Specialty of the "package physician" may explain some portion of the variation in price. Table 6-12 compares the package price across specialty for the hypertension office visit package. The category, "other" specialist, includes a number of physician specialists that do not fall into any of our specialty categories, viz., neurologists, psychiatrists, anesthesiologists, radiologists, pathologists, and plastic surgeons. We assume that this disparate group of physicians have changed their practice and are now providing routine medical office visits without having notified the Medicare Part B carrier.

The total package price (including all charges) varies considerably from \$20.27 for general surgeons to \$36.32 for "other" specialists. Specialty differences appear to be primarily a result of use of ancillary services rather than differences in charges for the visit. Internists and medical specialists are far more likely to order an ECG compared with GPs while general surgeons and multi-specialty group physicians are less likely on average to order clinical laboratory tests. Nevertheless, there is just as much variation within specialty packages as within the package as a whole (as seen in Table 6-11). Thus, a specialty-specific reimbursement scheme may not be any more equitable than a physician-wide pricing scheme.

There is no difference across specialties in the percent of charges paid directly to the package physician. For all specialties, between 98 and 99 percent are paid directly to the package physician.

Geographic location also has a direct relationship to package price, both because of geographic cost-of-living (COL) differences and differences in relative physician supply and referral patterns. Table 6-13 compares the cost of the office visit package across three geographic locations: Detroit, other urban localities, and rural areas. An office visit package in Detroit costs nearly 50 percent more than the same package in other SMSAs (\$30.95 vs. \$21.24), and about 75 percent more than in non-SMSA areas. Although there is a somewhat higher charge for the visit itself in Detroit, presumably reflecting COL and specialty differences, large systematic differences in ancillary use account for most of the differential in package costs across areas. Hypertension patients in Detroit are more likely to be billed for laboratory tests when compared with other SMSAs who, in turn, receive more intensive testing than those in rural areas. Not only is ancillary frequency much higher in Detroit, those patients receiving lab tests on a visit are

TABLE 6-12

HYPERTENSION OFFICE VISIT PACKAGES BY SPECIALTY<sup>a</sup>

	GP-DO (11.2%)		GP-MD (24.3%)		General Surgeon (7.3%)		Multi-Spec. Group (16.5%)		Medical Specialist (34.2%) (3.5%)		Surgical Specialist (1.9%) (1.2%)		Other (1.2%)	
Office Visit	\$14.47 (1.00)	\$13.98 (1.00)	\$14.61 (1.00)	\$16.58 (1.00)	\$16.39 (1.00)	\$16.62 (1.00)	\$15.81 (1.00)	\$16.83 (1.00)						
X-rays	27.91 (0.03)	34.19 (0.03)	29.35 (0.04)	26.42 (0.05)	30.56 (0.04)	21.38 (0.03)	36.30 (0.03)	25.23 (0.05)						
ECGs	34.91 (0.02)	34.48 (0.03)	24.04 (0.02)	31.13 (0.03)	29.77 (0.07)	31.01 (0.09)	25.93 (0.02)	26.62 (0.03)						
Injections	5.65 (0.17)	5.05 (0.15)	3.32 (0.09)	5.71 (0.06)	12.57 (0.04)	5.37 (0.01)	5.30 (0.19)	5.70 (0.21)						
Laboratory Tests	43.31 (0.21)	45.86 (0.20)	38.08 (0.10)	59.59 (0.11)	47.35 (0.21)	44.04 (0.16)	56.69 (0.18)	69.29 (0.24)						
Total Package Price (package physician)	\$25.56	\$25.15	\$19.20	\$25.57	\$28.94	\$26.53	\$27.80	\$35.65						
Coefficient of Variation	144.1%	165.9%	189.3%	149.7%	139.1%	116.0%	196.6%	171.9%						
Total Package Price	\$26.15	\$26.00	\$20.27	\$25.43	\$30.11	\$27.25	\$28.38	\$36.32						
Coefficient of Variation	142.5%	167.3%	140.4%	147.8%	138.8%	115.0%	193.2%	170.0%						
Percent of All Charges from Package Physician	98.8%	98.7%	98.0%	98.4%	98.2%	98.6%	98.9%	99.2%						

<sup>a</sup>Dollar values represent Michigan reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.



TABLE 6-13

HYPERTENSION OFFICE VISIT PACKAGES BY LOCALITY<sup>a</sup>

	Detroit (66.7%)	Other Urban (15.7%)	Rural (17.6%)
Office Visit	\$16.43 (1.00)	\$14.10 (1.00)	\$13.19 (1.00)
X-rays	32.65 (0.03)	29.79 (0.04)	19.68 (0.04)
ECGs	30.26 (0.05)	30.88 (0.04)	33.99 (0.03)
Injections	6.33 (0.11)	5.38 (0.08)	5.46 (0.04)
Laboratory Tests	54.42 (0.21)	29.34 (0.15)	24.36 (0.12)
-----			
Total Package Price (package physician)	\$30.00	\$20.04	\$17.24
Coefficient of Variation	149.8%	115.1%	129.7%
-----			
Total Package Price	\$30.95	\$21.24	\$17.87
Coefficient of Variation	149.1%	121.7%	128.9%
-----			
Percent of All Charges from Package Physician	98.6%	97.9%	98.5%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency of each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

either having more done and/or the charges are much higher. On average, office visits in Detroit have \$11.43 ( $=\$54.42 \cdot .21$ ) worth of lab charges vs. only \$2.92 in rural areas, a difference of four-fold. This \$8.50 difference, in fact, explains practically all of the interarea price inequality not explained by the office visit fee itself. These differences probably reflect the concentration of higher priced, more ancillary-oriented specialists in the urban areas.

#### 6.3.4 Variation in Visit Charges and Intensity for New vs. Established Patients

How much of this geographic variation might be due to a different mix of new vs. established patients? Our claims data offer a unique opportunity to compare the price and content of office visits for a single, narrowly defined condition: a new hypertension visit.

First, Table 6-14 shows the systematic differences in price and content of new vs. established patients using the Michigan data. New visits, in general, cost about 60 percent more than "old" visits, due to a combination of a higher visit fee and more x-rays and ECGs. Lab tests also add to the cost of a new patient visit, but only for those patients having any lab tests.

We next look at the mix of inputs provided to new patients across localities (Table 6-15) and specialties (Table 6-16). Physicians located in Detroit charge an average of \$54.64 for a hypertension visit package while physicians in other SMSAs average \$30.31 and those in rural localities, only \$25.47. The differential in the visit fee accounts for some of the variation. More striking is the difference in the frequency with which laboratory tests are ordered and in the average laboratory fee charged by physicians located in Detroit. Lab test costs per average new visit were only \$4.91 ( $= \$37.84 \cdot .13$ ) vs. \$21.96 ( $= \$115.61 \cdot .19$ ) in Detroit, nearly a five-fold difference. By contrast, Detroit visit fees average only 40 percent more. Clearly, the locality intensity differences shown in Table 6-13 have nothing to do with the new vs. established mix of patients. It is also hard to ascribe the discrepancy to casemix, as principal diagnosis is being held constant.

Table 6-16, which presents the same data on new visits by specialty, sheds little light on the regional variation. Concentrating on lab tests which show much higher charges in Detroit, we see that internists and medical specialists (e.g., cardiologists) use these services more frequently than GPs, but charge less per visit when they actually run tests. Hence, the fact that GPs are

TABLE 6-14

HYPERTENSION OFFICE VISIT PACKAGES FOR NEW AND ESTABLISHED PATIENTS<sup>a</sup>

	New Visits (8.6%)	Old Visits (91.3%)	All Visits (n = 19,506)
Office Visit	\$23.53 (1.00)	\$14.74 (1.00)	\$15.49 (1.00)
X-rays	25.86 (0.07)	30.62 (0.03)	29.88 (0.04)
ECGs	24.89 (0.10)	32.09 (0.04)	30.71 (0.04)
Injections	4.93 (0.06)	6.21 (0.09)	6.14 (0.09)
Laboratory Tests	83.26 (0.16)	44.71 (0.18)	47.69 (0.18)
-----			
Total Package Price (package physician)	\$40.17	\$24.87	\$26.19
Coefficient of Variation	165.1%	142.7%	150.3%
-----			
Total Package Price	\$41.50	\$25.78	\$27.13
Coefficient of Variation	163.0%	142.6%	149.7%
-----			
Percent of All Charges from Package Physician	98.1%	98.5%	98.5%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency of each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE 6-15

HYPERTENSION OFFICE VISIT PACKAGES FOR NEW VISITS BY LOCALITY<sup>a</sup>

	Detroit (52.1%)	Other Urban (17.2%)	Rural (30.7%)
Office Visit	\$26.92 (1.00)	\$21.59 (1.00)	\$18.86 (1.00)
X-rays	30.21 (0.08)	21.26 (0.05)	16.79 (0.05)
ECGs	25.38 (0.14)	24.43 (0.11)	22.08 (0.03)
Injections	4.95 (0.10)	5.24 (0.02)	4.28 (0.01)
Laboratory Tests	115.61 (0.19)	33.12 (0.15)	37.84 (0.13)
-----			
Total Package Price (package physician)	\$53.94	\$28.98	\$24.77
Coefficient of Variation	159.5%	89.3%	143.5%
-----			
Total Package Price	\$54.64	\$30.31	\$25.47
Coefficient of Variation	157.8%	89.6%	142.2%
-----			
Percent of All Charges from Package Physician	97.9%	97.8%	98.6%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency of each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE 6-16

HYPERTENSION OFFICE VISIT PACKAGE FOR NEW VISITS BY SPECIALTY<sup>a</sup>

	GP-DO (6.5%)	GP-MD (27.3%)	General Surgeon (8.5%)	Multi-Spec. Group (14.9%)	Internist (34.8%)	Medical Specialist (2.1%)	Surgical Specialist (3.9%)	Other (1.8%)
Office Visit	\$20.95 (1.00)	\$18.08 (1.00)	\$18.34 (1.00)	\$31.85 (1.00)	\$25.52 (1.00)	\$30.18 (1.00)	\$20.61 (1.00)	\$30.54 (1.00)
X-rays	14.13 (0.04)	43.61 (0.04)	21.48 (0.04)	23.71 (0.15)	23.39 (0.07)	17.85 (0.07)	24.90 (0.02)	7.18 (0.06)
ECGs	23.90 (0.06)	34.70 (0.03)	25.00 (0.01)	20.55 (0.12)	24.58 (0.17)	24.82 (0.30)	30.00 (0.02)	35.00 (0.03)
Injections	3.72 (0.03)	3.86 (0.03)	3.07 (0.06)	4.40 (0.04)	5.89 (0.08)	--	4.61 (0.15)	4.95 (0.32)
Laboratory Tests	57.17 (0.23)	104.32 (0.14)	29.31 (0.13)	155.55 (0.09)	67.81 (0.20)	43.50 (0.30)	116.83 (0.09)	150.31 (0.26)
Total Package Price (package physician)	\$35.32	\$34.36	\$22.41	\$50.30	\$44.26	\$47.96	\$32.56	\$72.52
Coefficient of Variation	153.7%	226.9%	100.5%	162.0%	120.8%	80.5%	208.6%	156.8%
Total Package Price	\$36.00	\$35.58	\$23.16	\$52.91	\$45.63	\$48.26	\$32.95	\$72.52
Coefficient of Variation	150.9%	228.1%	98.9%	154.2%	119.8%	79.9%	206.2%	156.8%
Percent of All Charges from Package Physician	98.4%	98.8%	98.4%	96.0%	98.1%	99.3%	99.2%	100.0%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency of each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

more equally distributed across urban and rural areas explains little of the regional differences. In other words, use of lab tests must vary systematically by area for all specialties.

### 6.3.5 Explaining Variation in Office Visit Package Prices:

#### Multivariate Analysis

In the preceding tables, we have observed a substantial amount of variation in the package price for an office visit, even though the diagnosis has been held constant. What are the independent effects of various factors on the package price? For example, how much more does it cost to have a specialist care for a hypertension patient? How much do the laboratory tests add to total package price? The following table shows the result of a multivariate analysis of the hypertension office visit package. A similar table for diabetes can be found in Appendix B (Table B 6-10).

The choice of package physician may have a major impact on total price, not only because certain specialists charge higher fees than others, but also because they may use more (or more costly) inputs. In order to examine both the direct and total (direct and indirect) effects of specialty, we employed stepwise regression techniques. First, we stepped in dummy variables for the specialty of the package physician. The  $R^2$  associated with the specialty dummies provide us with a measure of the total, or gross, contribution of specialty to package price: both the direct effect of the specialist's higher fee, and the indirect effect a specialist has because of the mix of other physician services he includes in the package. Second, we stepped in dummy variables for geographic location. These regression coefficients represent both the direct effect of cost-of-living differences and the indirect effect of area treatment patterns. Third, we stepped in patient characteristics including sex, age, and whether the patient was an established or new patient. Finally, we stepped the other physician inputs into the regression equation. The regression coefficients associated with the specialty and location variables at this stage provide a measure of their direct, COL effect on price alone while those on the inputs represent average unit costs (in terms of physician bills).

While individual specialties are statistically significant in explaining package price, specialty alone explains only one half of one percent of the total variation ( $R^2=.005$ , column 1, Table 6-17). Internists and other specialists add substantially to the package price (\$4.09 and \$10.28,

TABLE 6-17

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR HYPERTENSION OFFICE VISIT PACKAGES

	Regressions				Means
	(1)	(2)	(3)	(4)	
Total Package Price	--	--	--	--	27.15
Specialty of Physician <sup>a</sup>					
General Surgeon	-5.77***	-6.16***	-6.26***	-0.69	0.07
GP-DO	0.05	0.04	0.84	0.63	0.11
Internist	4.09**	2.45***	2.46***	1.29**	0.34
Multi. Spec. Group	-0.61	-3.78***	-3.67***	1.97**	0.16
Medical Specialist	1.20	-1.04	-0.64	0.67	0.04
Surgical Specialist	2.33	0.37	-1.28	1.30	0.02
Other (not GP-MD)	10.28***	8.18**	7.38**	6.07**	0.01
Location <sup>a</sup>					
Detroit		10.21***	10.74***	6.74**	0.67
Rural		-2.87***	-3.87***	-1.68**	0.18
Patient Type <sup>a</sup>					
Established patient			-18.11***	-14.46***	0.91
Patient Sex <sup>a</sup>					
Male			-0.16	-0.52	0.32
Patient Age <sup>a</sup>					
Over Age 70			0.39	0.63	0.33
Services Provided <sup>a</sup>					
Chest X-ray				31.19***	0.02
Other X-ray				46.58***	0.02
ECG				43.18***	0.04
Injections				5.53***	0.09
Laboratory Tests				46.75***	0.18
CONSTANT	26.04***	21.00**	37.22**	22.83***	--
R <sup>2</sup>	.005	.023	.039	.370	
(df)	(7,19502)	(9,19500)	(12,19497)	(17,19488)	
F	14.32***	51.54***	65.23***	673.01***	

<sup>a</sup>General practitioner MD, other SMSA, new patients, female patients, patients less than age 70, no ancillary services, are in the intercept.

- \*\*\* Significant at one percent level.  
 \*\* Significant at five percent level.  
 \* Significant at ten percent level.

Source: Michigan 1981 Medicare Part B Claims Data.

respectively) while the general surgeons' package price is \$5.77 less than that of general practitioners. Other physician specialties (including neurologists, radiologists and pathologists) are the most expensive, adding \$10.28 to the package price.

The price differential across physician specialties is largely due to the use of other inputs during the visit. Once we adjust for the lab tests, injections, etc., provided during the visit, the specialty differences are significantly reduced (column 4, Table 6-17).

The differences across geographic areas also prove to be large and significant, but again explain less than two percent of the price variation. The office visit package for physicians located in the Detroit area is \$10.21 more than in the other SMSAs and the package for physicians located in rural areas is \$2.87 less. This is the total geographic effect including area differences in cost of living, practice patterns and effects of local physician supply. If anything, these differences are widened when patient characteristics are held constant. Once we adjust for other inputs, the effect of location is diminished but does not disappear entirely: the package price for physicians located in Detroit is still \$6.74 more than in other SMSAs.

Patient characteristics fail to explain much of the variation in price. However, the price of a visit for an established patient is \$14.46 less than for a new patient, ceteris paribus.

Note that even after controlling for physician specialty, location, patient characteristics and other inputs, we still explain only 37 percent of the variation in the price of the office visit package. This may seem surprising, but it only reflects the large variation across patients in the intensity of ancillary use and physician fees.

#### 6.4 Summary and Conclusions

Because of the tremendous variation in medical problems encountered in the office, some sort of casemix adjustment would be required in office visit packages both for equity and acceptability reasons. The type of casemix measure employed, however, will have its own implications for efficiency, equity, and feasibility, as we have found here.

The most striking difference between the three casemix methods we examined is in the actual number of packages. The diagnosis approach implies potentially hundreds of packages, depending on the level of disaggregation



(e.g., two or three digit ICD codes) and the extent of combination across similar diagnostic categories (e.g., including angina pectoris, ICD-9 code 413, with code 414, chronic ischemic heart disease). By contrast, the Ambulatory Patient Group approach would result in 154 packages for reimbursement purposes, and the Reason for Visit approach only 14. Feasibility of implementation, potential for casinflation, and inter-specialty equity implications vary in large part as a function of the number of packages.

The rationale behind any casemix adjustment is to minimize the within-package variation in resource use, and in particular, to reduce that variation due to patient severity of illness. The more homogeneous the package, the less likely it is that physicians treating sicker patients will be unfairly penalized. Even after adjusting for casemix, however, tremendous variation remains in the inputs associated with an office visit package.

- None of the three casemix approaches appears to be superior in its ability to minimize variation.

This is surprising, as we would have expected a trade-off between the absolute number of packages and the extent of variability. Measures of within-package variation based on the intensity index, furthermore, may actually be underestimates.

- Coefficients of variation for hypertension and diabetes packages were 99 percent and 81 percent, respectively, based on our measure of resource use, versus a staggering 150 and 116 percent when calculated from actual claims data.

Efforts to explain within-package variation were generally unsuccessful.

- Although patient demographic and illness characteristics and physician specialty were significant determinants of visit intensity and package price, at best they explained 25 percent of variation and usually far less.

If so much variability remains, does it make sense to go to all the trouble of constructing casemix-based office visit packages in the first place? The answer is yes, for several reasons. First, one of the major motivations behind casemix adjustment in the first place is to ensure vertical equity. Physicians treating sicker patients on average should have their package price adjusted accordingly. Diagnosis, Reason for Visit, or Ambulatory Patient Group-based packages do allow for higher reimbursement of more complex cases. Although within-package variation is equally great for chronic ischemic heart

disease and chronic bronchitis, for example, the physician would receive 40 percent more for the heart patient than for the bronchitis patient (based on intensity indices of 1.24 and 0.88, respectively, from Table 6-4). Second, while casemix stratifiers would replace eleven CPT-4 office visit codes with a much larger number of categories, the bundling of associated ancillaries could lead to significant cost savings if physicians reduce ancillary use. Third, the source of the unexplained variation in visit intensity has very different implications for packaging. It is possible that we were not able to capture all legitimate differences in patient severity of illness with our NAMCS measures or with our claims data. If so, then we simply need more, or better, casemix measures for packaging purposes. (Given the wealth of patient data in the NAMC surveys, however, it is difficult to say what alternative casemix data could be obtained.) Alternatively, unexplained variation in office visit packages may be due to idiosyncratic physician behavior. Physicians may vary in how they treat patients simply as a function of how busy they are, or how much competition they're under. Here, we are indifferent to such variations for packaging purposes. Physicians who fill up downtime by spending more time with patients, for example, should not be reimbursed at a higher rate than more efficient practitioners.

Historically, casemix adjustment has been done implicitly through differential reimbursement of specialties. The presumption is that specialists see more complex cases and need to be compensated more as a result. Once payment is explicitly based on casemix, this should no longer be necessary. It is possible, however, that there are systematic differences in severity by specialty even within diagnosis. Internists, for example, may treat sicker hypertension patients than do GPs. If so,

- we found no empirical evidence for it; the specialty of the package physician explained less than one percent of the price variation in hypertension and diabetes office visit packages.

One of the problems with any casemix adjustment approach is the tendency toward "casemix inflation." Physicians may be encouraged to "upgrade" diagnostic severity, however measured, for billing purposes. The potential for casemix inflation is largely a function of (1) packaging definition; and (2) the actual number of packages.

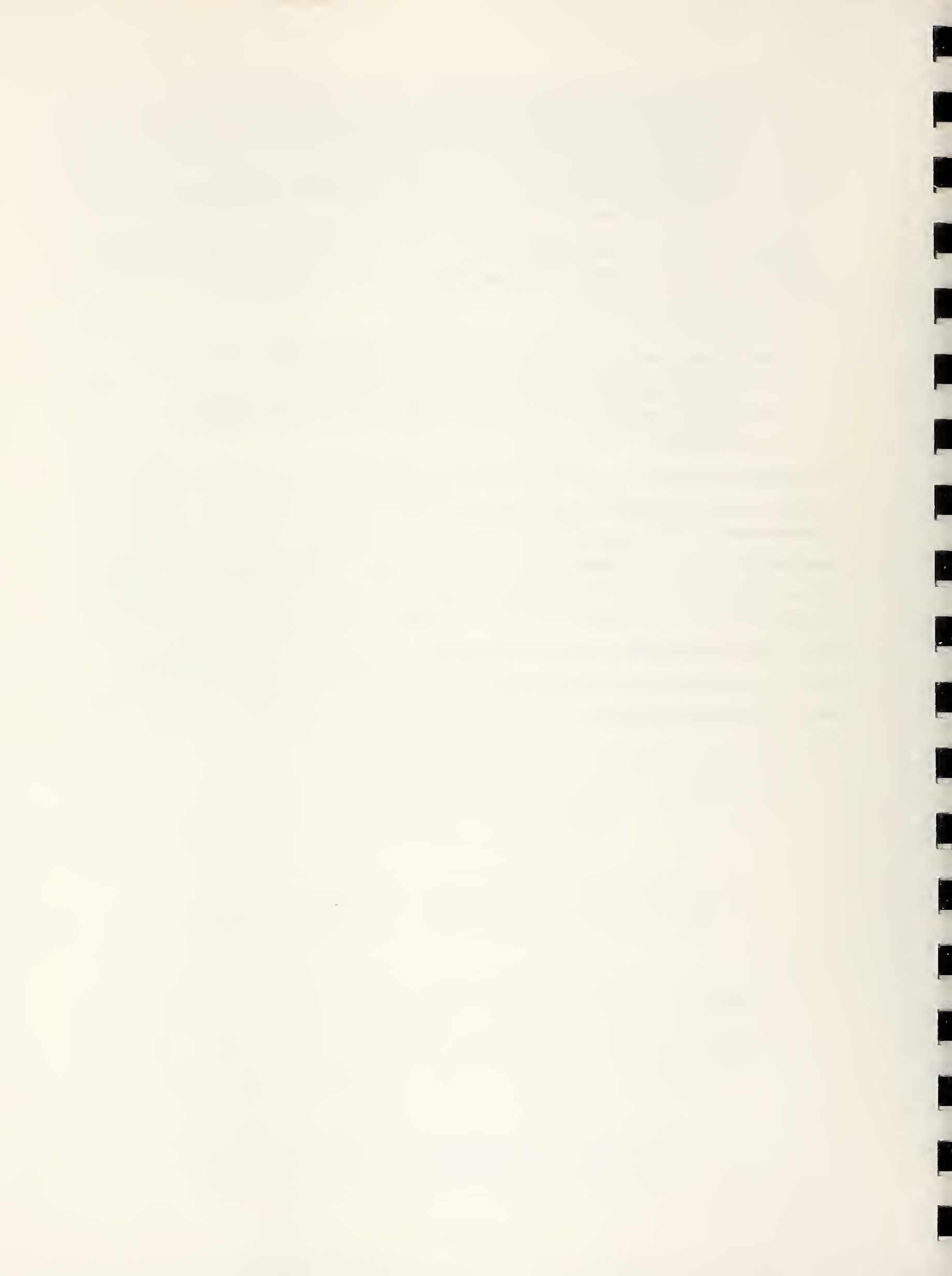
- The more subjective the criteria used to define the package, the easier it will be for the physician to label a visit as more complex than it actually is.

Criteria such as presenting problems, comorbidity, and reason for visit may be more sensitive to physician interpretation than diagnosis. Some criteria are not exogenous to the physician's treatment plan, furthermore, and thus can be directly manipulated by physicians, as in the physical exam criterion associated with Ambulatory Patient Groups (APGs).

Casemix inflation also becomes more likely, when there are more packages to choose from. This problem is identical to that associated with fractionated procedure codes.

- The finer the diagnostic detail delineating one package from another, the easier it will be to upgrade incrementally. Thus, 154 APG-based packages should be more susceptible to casemix inflation than 14 RFV-based packages.

For example, it would not be difficult for a physician to upgrade a heart disease patient from APG #6 (intensity index = 1.19) to #7 (index = 1.28). In both instances, these packages are revisits for old problems; both involve presenting symptoms of chest pain; neither include a physical exam. The only difference between them is that APG package #7 is for patients with a second diagnosis, hence its somewhat greater intensity. RFV-based packages, on the other hand, would require a more fundamental relabelling of the patient in order to upgrade the package, say, from a return chronic illness visit to a post-surgical care visit.



## 7.0 SPECIAL PROCEDURE PACKAGES

### 7.1 What Is A Special Procedure Package?

The Alternative Reimbursement Method discussed in this chapter is a payment package that would cover a basic set of physician services associated with a single procedure. Charges for physician services would be combined into a single bill and payment made in a lump sum to the physician primarily responsible for ordering or conducting the procedure, the so-called "package physician." What distinguishes this approach from others in this report is that it focuses on those special diagnostic and therapeutic procedures too uncommon or too costly to be packaged with other ancillary services.

Some special procedure packages address the problem of multiple physicians in a single surgical procedure as a factor contributing to the inflation in medical costs. The total payment under this scheme would be made to the surgeon, who would then pay any other physicians involved in the case. This would provide financial incentives to limit the use of assistant surgeons or the ordering of marginal tests or x-rays.

Other packages would be designed for diagnostic procedures where, in addition to billing for the procedure itself, the physician also has the option of billing separately for an office/hospital visit. Like the surgical packages, the physician would no longer have the option of charging for an office/hospital visit, nor would the radiologist be able to submit a separate bill for the interpretation of any "packaged" radiological procedures.

### 7.2 Policy Questions

In considering this package option, policymakers must be concerned with both its equity and efficiency implications. Our analysis will examine the sources of price variation introduced by physician specialty, location of procedure (office vs. hospital), and type of procedure (simple or complex), as well as the use of other physicians. Its purpose is to answer the following questions:

- (1) Which physicians would be most affected by the adoption of an average price for a procedure package?
- (2) What are the possible effects on Medicare beneficiaries under this payment scheme?

Further, by examining assignment rates for selected procedures, the potential effects of the packaging scheme on beneficiary access and out-of-pocket burden can be determined. Under the present system, a physician

can choose to accept assignment on a service by service basis. As part of procedure packaging, physicians accepting assignment would be obliged to accept the package price as payment in full for a set of services, limiting their ability to price discriminate. This may or may not result in lower assignment rates for physician charges as a whole.\*

### 7.3 Constructing Special Procedure Packages from Claims Data

Creating special procedure packages requires clear definitions of services to be included. The special procedure package is not as straightforward as the inpatient condition package (discussed later) which focuses on the services provided during an entire hospitalization, nor does it have the specified time limit of the ambulatory condition package.

Generally, two rules were used in selecting the services to be included in the special procedure package: (1) that the services be temporally proximate; and (2) that the services be directly related to the procedure. For inpatient surgical procedures, this was straightforward; the package included the surgeon, anesthesiologist, assistant surgeon (if used), and any operative x-rays. We had considered a more comprehensive definition, including all pre-operative diagnostic studies, but this proved hard to operationalize using claims data. Many patients may have undergone diagnostic tests on an outpatient basis, days, or even weeks, prior to admission.

Components of diagnostic procedure packages included the procedure itself, anesthesia (if any), a separate charge by the same physician for an office or hospital visit on the same day the procedure was performed, and related tests. These tests were defined separately for each procedure, and generally included complementary lab or x-ray studies. Thus, a barium enema was included in the sigmoidoscopy package, for example. The decision on exactly which tests were to be included was made by a physician (Dr. Stason) after reviewing the South Carolina claims data. Many tests which might have been considered medically appropriate components of a procedure package were not included because they were not performed with any frequency in South Carolina.\*\* Because of the time lag between the day the procedure actually was

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\*For example, in South Carolina, physicians accept assignment for a cystourethroscopy procedure itself in 45 percent of cases, yet only 33 percent of those charging for a visit accept assignment for a visit. Taking assignment on the package as a whole may raise rates on visits. Alternatively, packaging may reduce assignment rates on the procedure itself when tied to a visit.

\*\*Laboratory analysis of joint fluid would seem to be an important complement to arthrocentesis, for example, but such tests were virtually nonexistent in our data base.

performed and the day the radiologist might have reviewed the x-rays, we included tests performed up to 7 days post-procedure.

#### 7.4 Diagnostic Procedure Packages

Seven diagnostic procedures were analyzed: cystourethroscopy, upper GI endoscopy, bronchoscopy, colonoscopy, sigmoidoscopy, proctosigmoidoscopy, and arthrocentesis.\* These diagnostic procedures are particularly suited to a special procedure reimbursement scheme because there is usually only one physician involved, and each of the package components is provided at the same time and in the same location. Most importantly, variation in price across CPT-4 subcodes within the generic procedure is less than that for more complex surgical procedures, thereby limiting potential inequities inherent in a single price. The diagnostic procedures also provide an opportunity to examine variation introduced by specialty and location of service. Moreover, because some physicians choose to charge for an office visit separately, the analysis also examines the variance in charges unrelated to actual physician inputs.\*\*

##### 7.4.1 Sources of Variation in Three Diagnostic Procedure Packages

To begin the analysis, three diagnostic procedures, arthrocentesis, upper GI endoscopy, and cystourethroscopy, are discussed in detail. (Tables for the other four packages can be found in Appendix B 7.)

#### Arthrocentesis

Arthrocentesis, a common procedure in which a needle is inserted into a joint space of a knee, elbow, or shoulder to remove fluid for analysis, is performed by a number of specialties, including general practitioners, general surgeons, and orthopedic surgeons. Table 7-1 shows the physician charges and inputs associated with an arthrocentesis procedure package. As in previous chapters, all dollars are Medicare reasonable charges. The numbers in

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\*A package price for a more complex type of diagnostic/surgical procedure, cardiac catheterization, is more fully discussed in Chapter 9, the Inpatient Condition Package.

\*\*We cannot, of course, determine with any degree of certainty, whether there is a real difference in physician inputs between those cases with and without a visit charge. However, analysis of the South Carolina data suggest that this practice may be more a reflection of individual physicians' billing patterns rather than of physician specialty, location of procedure, or procedure differences.

TABLE 7-1

SPECIAL PROCEDURE PACKAGE BY SPECIALTY: ARTHROCENTESIS (MAJOR JOINT)<sup>a</sup>

	General Practice (24%)	Family Practice (12%)	General Surgery (9%)	Internal Medicine (11%)	Orthopedic Surgery (33%)	Rheumatology (6%)	All MDsb (n = 1,384)
Arthrocentesis	\$15.46 (1.00)	\$14.83 (1.00)	\$19.24 (1.00)	\$13.62 (1.00)	\$18.94 (1.00)	\$13.94 (1.00)	\$16.59 (1.00)
Same Day Visit	\$9.83 (0.52)	\$10.32 (0.61)	\$11.82 (0.16)	\$15.47 (0.57)	\$16.15 (0.57)	\$20.97 (0.92)	\$14.17 (0.55)
Percent Accepting Assignment <sup>c</sup>	56.1%	53.5%	52.7%	58.0%	38.8%	35.9%	47.8%
-----							
Total Package Price	\$20.53	\$21.15	\$21.08	\$22.39	\$28.09	\$33.20	\$24.34
Coefficient of Variation	26.2%	31.0%	25.8%	40.7%	33.2%	47.7%	38.6%

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequencies (by specialty) for each physician service are found in parentheses.

<sup>b</sup>Specialties shown represent 95 percent of all arthrocentesis claims.

<sup>c</sup>Assignment for the procedure only.

Source: South Carolina 1981 Medicare Part B Claims Data.



parentheses represent the relative frequency with which a physician component is included. A physician always performs the procedure itself (the fixed component), but he/she bills separately for a visit (the variable component) only 55 percent of the time in South Carolina.\* The total package price is a weighted sum of average payment times relative frequencies.

As seen in Table 7-1, the overall package shows considerable price variation (C.V.=39%). This is true even within specialty. Still, the coefficient of variation is generally lower within specialty (rheumatologists are an exception), implying that differences in average specialty charges and visit billing rates do add to the package's price inequalities. This is particularly true for orthopedic surgeons and rheumatologists, whose average package charge was \$6-12 more than the other four specialties. For orthopedists, higher fees in general explain the \$6 difference while for rheumatologists, it is both their higher office fee and almost universal visit billing rate that add \$12 above-and-beyond, say, a general surgeon's rate.

A rough, inverse correlation exists between charges for the arthrocentesis and the likelihood of the physician submitting a separate bill for the visit. General surgeons are a prime example. Their \$19.24 reasonable fee for the procedure is completely offset by their very low visit billing rates (only 16% vs. 55% on average). Obviously, most general surgeons already "package" the visit with the procedure, a practice not shared by other physicians, including orthopedic surgeons.

#### Upper GI Endoscopy

Another example of a special diagnostic procedure is the upper GI endoscopy, in which a flexible tube (fiberoptic) is inserted through the mouth into the stomach and upper intestine. The lining of the stomach and intestine is visualized and fluid samples and biopsies obtained. The package includes two variable inputs, a same day visit and an x-ray component, in addition to the procedure itself. The procedure is commonly performed by several specialties: general surgeons, internists,

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\*This percentage is probably a slight underestimate given that the visit bill had to be for the same day as the procedure.

gastroenterologists, and other medical specialists. It is primarily performed in a hospital, either on an inpatient basis (80.8%), or in the outpatient department (15.4%).

Medicare reasonable charges for this procedure are shown in Table 7-2. The coefficient of variation, unlike that for the arthrocentesis, is fairly low, both within specialty groups and for all cases (21%).

The package price for general surgeons, \$226.30, is somewhat higher than for the other specialties because their reasonable charge for the procedure itself is significantly higher. Again, this is offset to some extent by their lower likelihood of charging for a visit, i.e. 15 percent versus 32-36 percent for other specialists. Each specialty group orders x-rays about a third of the time.

### Cystourethroscopy

The cystourethroscopy procedure is performed by inserting a tube and/or fiberoptic through the urethra into the bladder, ureters, or kidneys. The procedure makes it possible to obtain urine samples and biopsies from various parts in the urinary tract.

Table 7-3 provides the relevant price and utilization data for this package. They clearly show much more price variation than the other two (the C.V. = 48%), due in part to the locus of service. The package price for the inpatient procedure is nearly twice that for the in-office procedure. More complicated procedures (those including a biopsy) are more often performed in an inpatient setting, which explains the price differential for the procedure itself by location. (But only in part -- urologist's charges for the simplest cystourethroscopy done in the hospital are still 65% higher than charges for the identical procedure performed in the office, \$91 vs. \$55.) Furthermore, the use of other physician inputs is more intensive for the inpatient procedure. An anesthesiologist is used in 25 percent of the inpatient procedures and never on an outpatient basis. Nevertheless, the amount of variation within the location categories is almost as large as for all procedures, leading to the conclusion that physician practice patterns must be an important contributor to the observed variation.

#### 7.4.2 Comparison of Seven Diagnostic Packages

The next table (Table 7-4) summarizes the package price, utilization, and assignment information for all seven diagnostic procedures. As described above, the package price represents Medicare reasonable charges in South

TABLE 7-2

SPECIAL PROCEDURE PACKAGE BY SPECIALTY: UPPER GI ENDOSCOPY<sup>a</sup>

	General Surgeon (25.9%)	Gastro- enterologist (44.0%)	Internist (22.7%)	All <sup>c</sup> MDs (n = 762)
Surgeon	\$213.63 (1.00)	\$181.67 (1.00)	\$173.97 (1.00)	\$188.17 (1.00)
Same Day Visit	14.53 (0.15)	20.22 (0.36)	17.62 (0.32)	18.51 (0.30)
X-rays <sup>b</sup>	30.30 (0.34)	29.10 (0.30)	33.61 (0.33)	30.71 (0.33)
-----				
Total Package Price	\$226.30	\$197.60	\$190.75	\$203.94
Coefficient of Variation	20.6%	20.3%	17.2%	21.0%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequencies (by specialty) for each physician service are shown in parentheses.

<sup>b</sup>Includes upper GI radiologic exam.

<sup>c</sup>Specialists shown represent 93 percent of total sample.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 7-3

SPECIAL PROCEDURE PACKAGE: DIAGNOSTIC CYSTOURETHROSCOPY<sup>a</sup>

	<u>Office</u> (32.2%)		<u>Hospital</u> (67.8%)		<u>All</u> (n = 1,099)	
Surgeon	\$55	(1.00)	\$104	(1.00)	\$88	(1.00)
Anesthesiologist	--		65	(0.25)	65	(0.17)
Related Urinary Diagnostic Procedures <sup>b</sup>	39	(0.08)	51	(0.23)	49	(0.19)
Urologist Consult	20	(0.01)	34	(0.17)	34	(0.12)
Routine Office/Hospital Visit (Urologist)	17	(0.37)	21	(0.26)	19	(0.30)
X-Rays (radiologist)	54	(0.21)	35	(0.29)	40	(0.27)
Urine Tests	6	(0.64)	5	(0.30)	5	(0.41)
Surgical Tray	10	(0.14)	--		10	(0.05)
-----						
Total Package Price	\$81		\$154		\$131	
Coefficient of Variation	45%		38%		48%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequencies (by site) for each physician service are found in parentheses.

<sup>b</sup>Surgeons' fees only. Includes cystometrogram, electromyography, retrograde urography, etc.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 7-4

## SPECIAL PROCEDURE PACKAGE: DIAGNOSTIC PROCEDURES

	Medicare Reasonable Charges <sup>a</sup>	Percent Charging For Visit	Reasonable Charges for MDs Accepting Assignment	Percent Accepting Assignment
Upper GI endoscopy n = 762	\$203.94 (21.0%) <sup>b</sup>	30%	\$176.05 (41.7%)	68.6% 19.8%
Bronchoscopy n = 1,338	200.25 (33.4%)	30	189.59 (36.2%)	72.6 18.5
Colonoscopy n = 388	262.05 (34.7%)	35	225.98 (52.5%)	55.7 18.6
Arthrocentesis n = 1,384	24.34 (38.6%)	55	\$23.84 (33.8%)	34.8 18.6
Sigmoidoscopy n = 549	74.08 (42.0%)	32	65.47 (49.9%)	49.7 13.3
Proctosigmoidoscopy n = 1,581	51.97 (44.8%)	59	42.12 (49.7%)	26.2 9.7
Cystourethroscopy n = 1,099	130.00 (48.8%)	33	137.81 (66.4%)	44.5 9.6

<sup>a</sup>Dollars are Medicare reasonable charges weighted by the frequency of each package component.

<sup>b</sup>Coefficient of variation expressed as a percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

Carolina for each procedure. Of interest is the amount of variation in the price of each diagnostic special procedure package and the possible reasons for the observed variation. This is why we have ordered the table by the coefficient of variation from low to high.

On a minimal-variance criterion, the upper GI endoscopy is the best candidate for packaging as a special procedure, followed by the bronchoscopy and colonoscopy.\* Cystourethroscopy, as currently packaged, would not be a good candidate based on this criterion, even if locus of service is used as a stratum.

Apart from the specialty and location differences discussed in the preceding examples, the package price varies because of the practice of charging for an office/hospital visit in addition to the procedure. The percentage of cases where the physician charges for a visit varies from 30 percent for a bronchoscopy and upper GI endoscopy to 59 percent for a proctosigmoidoscopy. As expected, physicians appear more likely to charge for a visit when also performing less expensive procedures.

The proportion of procedures taken on assignment also varies widely, but systematically, with average price (see Table 7-4). The inexpensive proctosigmoidoscopy is taken on assignment far less frequently (26.2% of cases) than a costly bronchoscopy (where 72.6% are done on assignment).

With few exceptions, assignment for the visit is opted for only by physicians who also accept assignment for the procedure. The low assignment rates suggest that Medicare reasonable charges for office visits are not considered adequate by nearly all physicians in the sample.

Patterns of assignment can be used to estimate an alternative package price if physicians were obligated to accept assignment. We have estimated an alternative package price based only on the cases where physicians accepted assignment. As shown in Table 7-4, this would have a significant effect on the package price for diagnostic procedures, representing a 5 to 20 percent decline for all but the cystourethroscopy procedure.

## 7.5 Surgical Procedure Packages

Procedure-based packaging also has definite advantages as a method of reimbursing surgical services. The surgical procedure becomes the basis of payment, including payment for the surgeon, an assistant (if any), the

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\*We note that the observed coefficient of variation for some procedures may be low because the number of unique physicians performing the procedure is small. Such may not be the case in other states.

anesthesiologist, and any radiologist or pathologist fees for operative x-rays and lab tests. By concentrating just on the surgery, there is little difficulty in identifying which services are related to the procedure, nor in determining the time frame of the episode. Multiple physician billing is also controlled.

#### 7.5.1 Sources of Variation in Three Surgical Procedure Packages

Three high volume Medicare procedures are included as illustrations of the special procedure surgical package: cholecystectomy, hip replacement/reconstruction, and inguinal hernia repair. Tables are included in Appendix B 7 for coronary artery bypass grafts, lens extraction, transurethral resection of the prostate, and pacemaker insertion.

##### Cholecystectomy

Table 7-5 shows physician charges and inputs associated with a cholecystectomy (gall bladder removal) package. The package is shown for both the simple and for the more complex procedure which includes common bile duct exploration. A surgeon and an anesthesiologist are necessary for the performance of a cholecystectomy, but an assistant surgeon is discretionary, being used 28 percent of the time in South Carolina (see frequencies in parentheses).

The amount of variation in this package, as well as the other surgical packages, is generally much less than for the diagnostic special procedure packages. Likewise, because the package is defined with fewer inputs, the amount of variation for this special procedure package (C.V. = 17.3%) is substantially less than for a cholecystectomy inpatient condition package (see Chapter 9, Table 9-2). The fixed components, including the surgeon's and the anesthesiologist's fees, account for 94 percent of the total package price. Note, too, the limited contribution to explained variation made by type of operation, simple vs. complex.

##### Hip Replacement/Reconstruction

By contrast, in the hip replacement/reconstruction procedure package (Table 7-6), the intra-package variation for two individual procedures (C.V.s=11-17%) is far less than that for the both procedures combined (C.V.=33%). In fact, we have grouped these two procedures together only because they are both currently in the same hospital DRG. While hospital resource use may be the same, the data in this table show obvious differences

TABLE 7-5

SPECIAL PROCEDURE PACKAGE: CHOLECYSTECTOMY<sup>a</sup>

	<u>All Cases</u> (n = 1,170)	<u>Simple</u> (75.9%)	<u>Complex</u> <sup>b</sup> (24.1%)
Surgeon	\$613 (1.00)	\$588 (1.00)	\$692 (1.00)
Assistant Surgeon	124 (0.28)	117 (0.27)	141 (0.31)
Anesthesiologist	151 (1.00)	142 (1.00)	180 (1.00)
Cholecystography	20 (0.25)	20 (0.26)	20 (0.24)
Operative Cholangiography	19 (0.47)	19 (0.41)	19 (0.65)
Other gall bladder X-rays	49 (0.04)	44 (0.01)	50 (0.12)
-----			
Total Package Price	\$815	\$775	\$939
Coefficient of Variation	17.3%	14.3%	16.3%

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequencies for each physician service are found in parentheses.

<sup>b</sup>Defined as cholecystectomy with open exploration of common duct.

Source: South Carolina 1981 Medicare Part B Claims Data.



TABLE 7-6

SPECIAL PROCEDURE PACKAGE: HIP RECONSTRUCTION AND REPLACEMENT<sup>a</sup>

	All Procedures (n = 420)	Hip Reconstruction (n = 180)	Total Hip Replacement (n = 240)	% Accepting Assignment
Surgeon	\$1,350 (1.00)	\$931 (1.00)	\$1,665 (1.00)	58.3%
Assistant Surgeon	319 (0.29)	172 (0.07)	337 (0.45)	53.3
Anesthesiologist	189 (1.00)	152 (1.00)	217 (1.00)	82.6
Hip X-ray <sup>b</sup>	19 (0.64)	18 (0.55)	20 (0.70)	5.6
-----				
Total Package Price	\$1,645	\$1,105	\$2,049	
Coefficient of Variation	33.1%	10.7%	17.3%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequencies for each physician service are found in parentheses.

<sup>b</sup>Radiologist fees only. Occurrence of hip x-rays may be underestimated since the radiologist charges may be reimbursed through part A. Package price may be underestimated by approximately \$8.50.

Source: South Carolina 1981 Medicare Part B Claims Data.

in physician input between the two procedures. A surgical assistant, for example, is used in 45 percent of the total hip replacements versus only 7 percent for the simpler reconstructions.

### Inguinal Hernia Repair

This procedure repairs a weakness in the abdominal wall to prevent the bulging of abdominal contents. Table 7-7 compares the hernia package price for both the unilateral and bilateral repair. Again, the package price includes mostly fixed inputs: the surgeon and anesthesiologist fees account for nearly the entire package price. The only variable component, use of an assistant, occurs in only six percent of cases.

Specialty differences are responsible for much of the variation in package price. (See Table B 7-11.) The procedure is most commonly performed by a general surgeon in South Carolina, but when performed by a general practitioner, the charge is generally much lower. The charge for a thoracic surgeon is somewhat higher.

### 7.5.2 Comparison of Eight Surgical Packages

We have packaged eight common Medicare surgical procedures and summarized them in Table 7-8. Each of the surgical packages include a fixed and variable component: a fee for the surgeon and for the anesthesiologist, and occasionally one for an assistant surgeon.

The packages include high, average, and low cost procedures. The most expensive are the coronary artery bypass grafts (CABGs) with a package price of \$4,166; the least expensive, a hernia repair at \$465.

An assistant surgeon is used in all CABG operations, which clearly reduces cost variation. Hip replacements, by contrast, use assistants 45 percent of the time, and their cost variation is much higher (C.V.=17.3%). The variation in cholecystectomy costs are also relatively high for this reason.

The low value of other ancillary costs adds little to cost variation for all of the surgeries except pacemaker insertions. Ancillary cost savings from packaging would, therefore, vary in the same manner--little for most packages with large potential savings for others (unless explained by other severity factors).

The coefficient of variation for the packages ranges from 10.7 percent for hip reconstruction to 23.8 percent for lens extractions. Greater variation is usually indicative of the aggregation of less complicated with more complicated operations, as we just saw for hip replacement vs. reconstruction.

TABLE 7-7

SPECIAL PROCEDURE PACKAGE: INGUINAL HERNIA REPAIR<sup>a</sup>

	Total Medicare Reasonable Charges (n = 740 <sup>b</sup> )	Type of Procedure		Reasonable Charges for MDs Accepting Assignment
		Unilateral (84.9%)	Bilateral (15.1%)	
Surgeon	\$385 (1.0)	\$365 (1.00)	\$498 (1.00)	\$379 (0.63)
Assistant Surgeon	76 (0.06)	67 (0.06)	109 (0.08)	79 (0.03)
Anesthesiologist	76 (1.00)	73 (1.00)	91 (1.00)	71 (0.90)
-----				
Total Package Price	\$465	\$441	\$598	
Coefficient of Variation	18.5%	11.9%	18.6%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequencies for each physician service are found in parentheses.

<sup>b</sup>For cases without other major surgery.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 7-8

SPECIAL PROCEDURE PACKAGES: SURGICAL PROCEDURES<sup>a</sup>

	Hip Reconstruction (n = 180)	Coronary Artery Bypass Grafts (n = 236)	TURP (n = 2,431)	Pacemaker (n = 653)	Cholecystectomy (n = 1,170)	Total Hip Replacement (n = 3,071)	Hernia Repair (n = 740)	Lens Extraction (n = 3,071)
Surgeon	\$931 (1.00)	\$3,072 (1.00)	\$695 (1.00)	\$655 (1.00)	\$613 (1.00)	\$1665 (1.00)	\$385 (1.00)	\$942 (1.00)
Assistant Surgeon	172 (0.07)	604 (1.00)	174 (0.03)	127 (0.45)	124 (0.28)	337 (0.45)	76 (0.06)	211 (0.03)
Anesthesiologist	152 (1.00)	490 (1.00)	111 (1.00)	141 (0.26)	151 (0.26)	217 (1.00)	76 (1.00)	156 (1.00)
Other Service <sup>b</sup>	18 (0.55)	--	42 (1.00)	302 (0.03)	35 (0.47)	20 (0.70)	88 (0.18)	--
-----								
Total Package Price	\$1,105	\$4,166	\$813	\$714	\$815	\$2,049	\$465	\$1,146
Coefficient of Variation	10.7%	11.6%	14.8%	16.0%	17.3%	17.3%	17.3%	23.8%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequencies by specialty for each physician service are shown in parentheses.

<sup>b</sup>Other services for all procedures except pacemaker insertion are radiologist fees for operative x-rays. For pacemaker insertion, other services include pacemaker repair as well as operative fluoroscopy.

Source: South Carolina 1981 Medicare Part B Claims Data.

## 7.6 Explaining Variation in Special Procedure Package Prices:

### Multivariate Analysis

The above discussions have focussed on the significant amount of variation in total physician charges for the diagnostic and surgical special procedure packages. We have determined in general what the sources of intra-package variation are, but not their independent effects on the total package price. For example, how much does the decision to charge for a visit add to the level of variance in price of an arthrocentesis? What is the effect on the package price if the physician accepts assignment? How much does specialty alone contribute to explained variation?

Regression analysis has been used to explain within-package variation in price. The specialty of the physician, location, and use of physician inputs have been included as possible sources of the variation. Further, assignment patterns have been included after controlling for these other factors.

In general, the multivariate method allows for the introduction of each factor in a stepwise fashion in order to evaluate both its direct and indirect effects. Within a package, the choice of physician may have a major impact on price, not only because of the fee differences among specialties, but also because they may use more (and more costly) inputs. First, we step in dummy variables for the specialty of the surgeon. The  $R^2$  associated with the specialty dummies alone provide us with a measure of the total contribution of specialty to package price: both the direct effect of the specialist's higher fee and the indirect effect due to the mix of other physician services included in the package. We then step the other physician inputs into the regression equation. The regression coefficients associated with the specialty variables at this stage provide a measure of their direct effect on price alone while those on the inputs will be their average unit cost (in terms of physician bills). The increase in the  $R^2$  tells us how much of the variation in package price is due to within-specialty variation in input use.

For illustrative purposes, we present regression tables for four of the special procedure packages: hernia repair, arthrocentesis, cholecystectomy, and upper GI endoscopy. A similar table for the hip reconstruction/replacement package can be found in Appendix B (Table B 7-11).

The choice of a surgeon definitely contributes to the total package price for a hernia repair (see Table 7-9). Thoracic surgeons add an extra \$31.85 to the general surgeon's package price while other surgical specialists cost \$46 less. Nevertheless, specialty alone counts for only 2 percent of the variation in package prices.

TABLE 7-9

EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR INGUINAL HERNIA REPAIR

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	464.82
Specialty of Surgeon <sup>a</sup> :				
General Practitioner	-20.73	-13.02	-87.54***	-101.06***
Family Practitioner	-97.84***	-72.52**	-69.55**	-64.85*
Thoracic Surgeon	31.85***	42.19***	33.29***	33.28***
Other Surgeon (not general)	-46.47**	-45.53**	-42.06**	-36.76*
Type of Procedure <sup>a</sup> :				
Bilateral Procedure		158.47***	155.21***	152.37***
Assistant Surgeon <sup>a</sup>			100.10***	82.89***
Assignment taken <sup>a</sup> :				
Assignment Taken by Surgeon				-6.07
Assignment Taken by Assistant Surgeon				23.75
Assignment Taken by Anesthesiologist				-52.49***
CONSTANT	463.35***	438.01***	435.06***	486.89***
P2	0.02	0.46	0.52	0.56
(df)	(4,735)	(5,734)	(6,733)	(9,730)
F	4.79**	126.55***	133.55***	102.94***

<sup>a</sup>General surgeon, unilateral procedure, no assistant, no assignment taken are in the intercept.

- \*\*\* Significant at one percent level.
- \*\* Significant at five percent level.
- \* Significant at ten percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

Considerably more of the variation is accounted for by type of procedure and the mix of inputs used. The bilateral procedure adds \$159 to the cost of the package, and explains an additional 44 percent of the variation. When further adjustments are made for whether or not an assistant was used, 5 percent more is explained. Note the large, negative change in the GP coefficient once an assistant is held constant. Apparently, the total package price for GPs performing hernia repairs is no less than the general surgeon's because GPs utilize assistants more often.

Specialty differences, while statistically significant, also explain very little of the price variation for cholecystectomies (see Table 7-10). Controlling for type of procedure and the use of an assistant raises explained variation again to nearly 50 percent. Whether or not the surgeon, assistant, and/or anesthesiologist takes assignment lowers the package price by as much as \$84.12, based on the total of the three assignment coefficients from Table 7-10, column 5.

A similar analysis of two diagnostic special procedure packages for upper GI endoscopy and arthrocentesis is shown on Tables 7-11 and 7-12. Specialty differences alone account for nine percent of the variation in package price for the upper GI endoscopy procedure, with all medical specialists exhibiting lower total package charges than the general surgeon. Holding specialty, location and radiologic exams constant, the practice of charging separately for a same day visit adds \$11.50 to the package price. (See column 4, Table 7-11.) Likewise, x-rays add \$33.78 to the package price. Also note that the lower charge for an OPD or office endoscopy is entirely due to the lower frequency of x-rays; the significance of the location coefficient disappears once x-rays are held constant.

The arthrocentesis regressions shows similar results, except that specialty now accounts for 16 percent of the variation in package price. The procedure when performed by an orthopedist costs \$7.09 more than when performed by a general practitioner. (See column 2, Table 7-12.) Holding the specialty of the physician constant, charging for a same day visit adds \$9.16 to the package price. The differential in price for an inpatient procedure is \$1.63. The addition of the visit charge and location to specialty improves the explanatory power of the regression by 20 percent ( $R^2 = .37$ ; column 2 of Table 7-12). Overall, these results suggest that a reimbursement scheme based on specialty or location may not be appropriate since these factors explain little more than a third of the total variation in package price.

TABLE 7-10

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR CHOLECYSTECTOMY

	Regressions					Means
	(1)	(2)	(3)	(4)	(5)	
Total Package Price	--	--	--	--	--	814.85
Specialty of Surgeon <sup>a</sup> :						
Thoracic Surgeon	69.52***	61.01***	26.01**	28.17**	30.68**	0.08
Other Surgeon (not general)	-68.00**	-56.35**	-92.09***	-103.86***	-94.55**	0.03
Type of Procedure <sup>a</sup> :						
Operation included exploration of common bile duct		161.30***	155.41***	160.30***	155.85**	0.24
Assistant Surgeon			141.53***	162.17***	162.77***	0.28
Assignment Taken <sup>a</sup> :						
Assignment Taken by Surgeon				-15.12**	-13.85**	0.67
Assignment Taken by Assistant				-27.79**	-26.58**	0.21
Assignment Taken by Anesthesiologist				-37.21***	-43.69***	0.47
X-ray Procedures <sup>a</sup> :						
Patient Received Cholangiography or Cholecystograms or other gall- bladder X-rays					34.77***	0.57
CONSTANT	811.24***	772.70***	738.66***	765.53***	748.11***	--
R <sup>2</sup>	0.03	0.27	0.46	0.49	0.50	
(df)	(2,1167)	(3,1166)	(4,1165)	(7,1162)	(8,1161)	
F	15.95***	141.51***	252.10***	159.18***	147.09***	

<sup>a</sup>General surgeons, procedure with no exploration of common bile duct, and no assignment taken included in the intercept.

\*\*\* Significant at one percent level.

\*\* Significant at five percent level.

\* Significant at ten percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.



TABLE 7-11

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR DIAGNOSTIC UPPER GI ENDOSCOPY

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	203.94
Specialty of Physician <sup>a</sup> :				
Gastroenterologist	-26.03***	-25.94**	-27.23***	-26.49***
Internist	-32.88***	-32.68***	-33.25***	-32.33***
Multi-Specialty Group	-20.49**	-21.13***	-21.86***	-27.52***
Location <sup>a</sup> :				
Outpatient/Office Procedure		-13.14***	-12.66***	-1.27
Separate Charge for Visit <sup>a</sup>			6.62*	11.50***
Patient had Hip X-ray <sup>a</sup>				33.78***
CONSTANT	223.63***	226.08***	225.29***	210.98***
R <sup>2</sup>	0.09	0.11	0.11	0.24
(df)	(3,758)	(4,757)	(5,756)	(6,755)
F	26.22***	23.06***	19.10***	39.16***

<sup>a</sup>General surgeon, inpatient procedure, no charge for a visit, and no x-ray included in the intercept.

\*\*\* Significant at one percent level.

\*\* Significant at five percent level.

\* Significant at ten percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 7-12

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR ARTHROCENTESIS (MAJOR JOINT)

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	24.34
Specialty of Physician <sup>a</sup> :				
General Surgeon	0.55	3.85***	3.79***	0.09
Family Practitioner	0.62	-0.27	0.34	0.11
Internist	1.86**	1.39***	1.27*	0.11
Orthopedic Surgeon	7.56***	7.09***	7.04***	0.33
Other Surgeon	9.37***	6.56***	6.31***	0.10
Separate Charge for Visit <sup>a</sup>		9.16***	9.16***	0.55
Location <sup>a</sup> :				
Inpatient Procedure			1.63*	0.05
CONSTANT	20.53***	15.81***	15.80***	
R <sup>2</sup>	0.16	0.37	0.37	
(df)	(5,1378)	(6,1377)	(7,1376)	
F	51.64***	136.27***	117.44***	

<sup>a</sup>General practitioner, no charge for visit and office/outpatient procedure in the intercept.

- \*\*\* Significant at one percent level.  
 \*\* Significant at five percent level.  
 \* Significant at ten percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

## 7.7 Effects of Packaging on Physician Specialties

We also used multivariate analysis to examine the effects of physician specialty on special procedure packaging. Although specialty is a significant factor in determining package price, specialty alone explains only a small amount of the variation in total package charges, as we just noted.

Table 7-13 summarizes the total impact of physician specialty (both direct and indirect) on the price of six diagnostic procedures.\* (The results are quite similar, if not more extreme, for most of the surgical procedure packages.) The amount of variation accounted for by specialty alone varied from 5.0 percent for bronchoscopy to 16.8 percent for proctosigmoidoscopy. As with the surgical packages, a package price stratified by specialty may not be significantly more equitable on average than one based on a physician-wide average.

Table 7-13 also shows the specialties that produce high, average, and low package costs for each procedure. Even using a limited set of procedures, we can conclude that low cost specialists in one procedure may produce high costs in another. For example, internists generate high costs for bronchoscopies, colonoscopies, and arthrocenteses, while producing low costs for upper GI endoscopies and sigmoidoscopies. In Chapter 10, we discuss the equity implications of alternative methods of payment for physician specialties.

## 7.8 Summary and Conclusions

Seven diagnostic and eight surgical procedure packages have been presented for consideration in this chapter. Clearly, they are not meant to be definitive, either in scope or price. We have made decisions on what ancillary procedures to include that may or may not be appropriate in retrospect. Moreover, all empirical work was based on Medicare claims for a single, Southern state. Hence, charges and utilization rates cannot be considered representative of the Medicare population nationwide.

Even with these caveats in mind, several conclusions, or generalizations, are still possible. First,

- surgical procedure packages generally show less variation than diagnostic packages, primarily because (a) we have limited the inputs a priori and (b) the surgeon's and anesthesiologist's fees account for most of the total package price.

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\*The cystourethroscopy procedure was omitted because it is performed only by urologists.

TABLE 7-13

SPECIALTY EFFECTS ON TOTAL PACKAGE PRICES: DIAGNOSTIC PROCEDURES<sup>a</sup>

	Percent of Variation Explained by Speciality Alone		Type of Physician	
	High Cost	Low Cost	Average	
Upper GI Endoscopy	9.0%		General surgeon	Gastroenterologist Internist Multi-Spec. Group
Bronchoscopy	5.0		Thoracic Surgeon General Surgeon	ENT
Colonoscopy	7.5		General Surgeon Proctologist Multi-Spec. Group Other Specialist	GP Thoracic Surgeon
Arthrocentesis	16.0		General Surgeon FP/GP	
Sigmoidoscopy	16.8		General Surgeon Proctologist Thoracic Surgeon Multi-Spec. Group Other Surgeon	GP/FP Internist Cardiologist
Proctosigmoidoscopy	6.2		Internist Cardiologist Thoracic Surgeon Multi-Spec. Group	GP/FP General Surgeon Gastroenterologist Proctologist Other Specialist

<sup>a</sup>Cystourethroscopy is omitted since it is performed only by urologists.

Source: South Carolina 1981 Medicare Part B Claims Data.

If surgical inputs are narrowly defined to include the surgeon, the anesthesiologist, and the assistant surgeon, plus directly-related operative tests, the variation in package price should be minimal. In some instances,

- the surgical procedure would have to be further divided (e.g., hip replacement vs. reconstruction),

but clearly, given the minimal contribution of specialty to the total package price,

- no further distinction in price seems necessary, either for specialty or use of assistants.

Two other points on surgical procedure packages are noteworthy. First,

- total package prices of general surgeons may not be any greater than when a general practitioner is involved because the GP is more likely to use an assistant. Given the low frequency of assistants for some surgeries, packaging their bill will likely affect GPs' behavior more than general surgeons', as well as saving Medicare dollars on what is probably a marginal input.

The second point relates to the

- relatively high variation found in a couple of surgical DRGs, hip replacement/reconstruction and lens extractions. Each currently has only one hospital DRG, but there are very systematic differences in physician charges by CPT-4 subcode. Hence, neither DRG would be adequate for physician reimbursement.

Turning to the diagnostic procedures, we find

- large variation for several packages due to 2-3 significant subprocedures (e.g., cystourethroscopy with catheterization);
- an inverse correlation between the basic procedure charge and the likelihood of a separate visit charge; and
- general surgeons more likely to have already included a visit charge in their procedure charge.

To create meaningful diagnostic procedure packages, care would have to be taken not to collapse completely all the associated CPT-4 codes into one package, but rather, to use a more moderate collapse, one that eliminated the need for some profiles while still encouraging less ancillary and subprocedure activity.

For the second two points, together, they imply

- a considerable amount of potentially latent billing for office visits. Apparently, physicians vary on whether to bill for an associated office visit. Without any Medicare regulations, however, any "squeezing" of procedure reimbursement could be easily offset by simply adding on a visit charge.

Finally, we have some evidence that

- some diagnostic procedures may be cheaper in an outpatient setting, primarily due to the lower frequency of x-rays and lab tests. Thus, a package that ignored location could encourage the use of fewer ancillaries -- possibly by performing the procedure in an OPD or office.

## 8.0 AMBULATORY CONDITION PACKAGES

### 8.1 Overview and Research Questions

The preceding chapters have explored new ways of packaging related physician services or bundling together complementary services from multiple physicians. These approaches, however, are based on traditional units of payment: the procedure or visit. In this chapter (and the one that follows), we base physician payment on the patient's medical condition. Here, the physician would be responsible for all aspects of a patient's treatment for a predetermined period of time. A lump sum payment would be made to the physician regardless of the type or quantity of care he provided (or indeed whether he provided any at all). Covered services would include all visits to the "package physician", all diagnostic and therapeutic services, as well as any consultations to other physicians. While similar in concept to the fully capitated beneficiary package, this approach does not cover the entire range of medical needs but only those associated with the treatment of a specific condition.

Condition packages may be based on either inpatient or outpatient care. Inpatient condition packages have particular intuitive appeal because the time span covering the package (i.e., hospitalization) can be easily and objectively defined. These packages are currently being referred to as "physician DRGs", and we examine them in depth in the following chapter (Chapter 9). In this chapter, we examine their ambulatory counterparts.

Defining the appropriate time period for ambulatory condition packages is much more difficult. For acute conditions, like flu or otitis media, the time period would consist of an open-ended but finite episode tied to the natural history of the disease. In the case of chronic conditions, a fixed interval would be more appropriate, e.g., diabetes management for three months.

Although condition packages imply by their name that differential payment would be based on the patient's diagnosis, other approaches are possible. Condition packages could be classified based on the reason for care, for example: stabilizing and treating a flare-up of malignant hypertension vs. monitoring a patient with essential benign hypertension. Since alternative classification schema for episodes of care have not been fully developed and tested,\* however, we define ambulatory condition packages here based on diagnosis.

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\*With the exception of DRGs and other classification symptoms for inpatient care.

In the chapter, we seek to answer the following questions:

- (1) What is the range and mix of physician services associated with an ambulatory condition package? What share of these services are provided by the package physician?
- (2) What impact does the specialty of the package physician have on total costs? What is the price differential between a package treated by an internist and one treated by a general practitioner? How much of the differential is due to higher fees and how much to greater service intensity?
- (3) How much of the utilization during the specified time period is "out-of-package"? That is, how much care is for treatment of a condition (or conditions) other than the one actually packaged?

Although our focus in this chapter is on ambulatory care, some proportion of the patients will inevitably be hospitalized during the package time period. Exclusion of any physician inpatient services from the package could result in windfall gains for physicians whose patients were hospitalized, as the fixed payment for ambulatory-services-only would be spread over a shorter ambulatory risk period, and might even encourage unnecessary admissions. Including inpatient services, on the other hand, would introduce a potentially large random component to the total package, and physicians would then be liable for all inpatient care as well. Sometimes hospitalization will be attributable to the ambulatory condition, but many times it will not. In order to examine this problem more closely, we also address the following:

- (4) How much more variation is introduced when the package is expanded to include physician inpatient services received during the specified time period? What is the probability that a patient will be hospitalized during the package period, and what is the net impact on total costs?

## 8.2 Constructing Episodes of Care

Using claims data, it was not possible to identify episodes of care for acute conditions, partly because these episodes are highly variable in duration and partly because diagnoses were not consistently reported. We chose, instead, to focus our analysis on fixed time intervals for two chronic conditions commonly found in a Medicare population: essential benign hypertension and diabetes mellitus. The package time frame was arbitrarily set at three months. Although other time periods are clearly possible,



shorter periods tend to be unwieldy from the insurer's perspective while intra-package variation is apt to be even greater for longer time periods.\* This form of packaging is similar to the diagnostic tracer methodology which examines utilization patterns for patients with identical illnesses (see, for example, Held and Manheim, 1980; LoGerfo, et al., 1978).

To construct the analytic data file, an "index" office visit with a diagnosis of hypertension (or diabetes) was identified. All utilization for the subsequent three month period was then abstracted. Because we are interested in the extent of "out-of-package" and inpatient care, all claims were included regardless of diagnosis or locus of service. In the section that follows, some analyses are limited to ambulatory utilization only. The physician providing the most visits having the package diagnosis was assumed to be the package physician. Although some error is undoubtedly introduced as a result, we believe it is relatively small. As will be seen later, the package physician was found to provide the majority of all services during the three-month period.

### 8.3 Variation in Physician Charges and Inputs

#### 8.3.1 Variation by Medical Condition

Table 8-1 shows the physician charges and inputs associated with a condition package for hypertension. This table includes all utilization for a three-month period, regardless of diagnosis. We examine the extent of out-of-package care later. The numbers in the first column of Table 8-1 represent the percent of patients who received a given physician service during the three month period. All patients made office visits to their package physician, for example, but only one-fifth (20.2%) had ECGs during this time. The next two columns in Table 8-1 are the mean number of services and mean total charge for those patients who received that service only. (All physician charges are 1981 Medicare reasonable charges.) As before, the total package price is a weighted sum of all physician charges for the three-month period. Two package prices are included on Table 8-1, one excluding and one including physician inpatient services (if any) during the time period.

Charges for ambulatory services averaged \$133.67 per hypertension patient over the three month period. The range in ambulatory package price is enormous, however, from \$7 to \$3,400, with a coefficient of variation of 136

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\*For very long time spans, say 12 months or more, this should be less true, as periods of high and low utilization cancel each other out.

TABLE 8-1

THREE-MONTH CONDITION PACKAGE FOR HYPERTENSION<sup>a</sup>

Type of Service	% With Service	For Patients with Service	
		No. of Services	Mean Charges
Office Visits to Package Physician	100.0%	2.4	\$36.74
Office Visits to All Other Physicians	29.3	1.9	33.52
Chest X-Rays	11.5	1.2	20.93
Other X-Rays	17.7	2.1	72.79
ECGs	20.2	1.5	64.98
Injections	13.5	4.9	17.78
Office Surgery	14.9	2.0	89.20
Lab Tests	43.5	8.8	77.48
Other Tests	8.8	1.9	105.49
-----			
Total Ambulatory Package Price	--	--	\$133.67
Coefficient of Variation	--	--	136%
-----			
Hospital	15.2%	--	\$795.42
Nursing Home	0.8	--	80.13
-----			
Total Package Price	--	--	\$265.99
Coefficient of Variation	--	--	189%

<sup>a</sup>All dollars are Medicare reasonable charges.

Source: Michigan 1981 Medicare Part B Claims Data.

percent. Visits to the package physician account for only 27 percent of this total (\$36.74/133.67), with another seven percent of average charges due to office visits to other physicians. The remaining two-thirds of the total package price is accounted for by ancillary services of all kinds, and in particular by lab tests. Physicians ordered lab tests for almost one out of every two hypertension patients (43.5%) during the package period, for example, with an added cost of \$77.

Even over our relatively short package period, a surprising number of hypertension patients were admitted to the hospital: 15 percent. This has the effect of doubling the average package price (from \$134 to \$266) and markedly increasing the within-package variation (note the C.V.=189% vs. 136%). Under this type of arrangement, physicians would probably end up being either significantly under- or over-paid in nearly every case. A package based on ambulatory utilization alone would be only somewhat more equitable. Of course, much of this variation in input mix may be due to the physician specialty treating the patient; if so, then specialty-specific payment rates might be more appropriate. We explore this directly in the next section.

A three-month condition package for diabetes is virtually identical in input mix and total ambulatory price (\$140 vs. \$134) to that for hypertension (see Table 8-2). In fact, these two conditions co-exist in a substantial minority of Medicare patients. Because physician utilization under the two packages is so similar, we limit the descriptive tables that follow to hypertension alone. (Comparable tables for diabetes packages can be found in Appendix B 8.)

### 8.3.2 Variation by Specialty and Geographic Location

The specialty of the package physician may explain some differences in package content and price. Table 8-3 compares a three-month condition package for hypertension across specialties. The ambulatory package price varies considerably, from \$109 for general surgeons to \$152 for GPs who are osteopaths (DOs). These specialty differences appear to be less a function of visit rates than of ancillary use. DOs, for example, are 50 percent more likely to order or perform clinical lab tests compared with general surgeons.\* Nevertheless, there is just as much variation in package charges

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\*Lab test utilization is probably biased downwards for those multi-specialty group physicians who are hospital-based. Their lab charges may have been billed through OPDs (as a Part A service) and thus are missing from our Part B data base. Lab test intensity for those physicians ordering tests, however, should be accurate.

TABLE 8-2

THREE-MONTH CONDITION PACKAGE FOR DIABETES<sup>a</sup>

Type of Service	For Patients with Service		
	% With Service	No of Services	Mean Charges
Office Visits to Package Physician	100.0%	2.6	\$38.28
Office Visits to All Other Physicians	31.9	2.0	33.52
Chest X-Rays	10.7	1.2	21.42
Other X-Rays	17.0	2.1	70.75
ECGs	17.7	1.5	58.14
Injections	12.0	5.3	18.50
Office Surgery	16.7	2.4	103.78
Lab Tests	63.7	7.6	59.43
Other Tests	8.4	1.9	102.78
-----			
Total Ambulatory Package Price	--	--	\$140.07
Coefficient of Variation	--	--	138%
-----			
Hospital	19.5%	--	\$783.47
Nursing Home	1.1	--	69.76
-----			
Total Package Price	--	--	\$306.96
Coefficient of Variation	--	--	185%

<sup>a</sup>All dollars are Medicare reasonable charges.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE 8-3

SPECIALTY DIFFERENCES IN THREE-MONTH CONDITION PACKAGES FOR HYPERTENSION<sup>a</sup>

	Specialty of Package Physician <sup>b</sup>				
	GP-DO (10.4%)	GP-MD (24.1%)	Internist (35.5%)	General Surgeon (6.4%)	Multi-Spec. Group (16.6%)
No. of Visits to Package Physician	2.8	2.6	2.2	2.6	2.2
Percent of Cases:					
Second Physician Involved	28.9%	27.3%	29.8%	32.9%	25.9%
X-Rays	25.8	23.9	27.8	20.0	29.1
ECGs	17.6	18.3	24.9	11.9	16.7
Injections	23.0	21.8	7.2	17.6	8.3
Office Surgery	15.4	12.5	14.9	13.8	17.6
Lab Tests	55.2	48.7	46.6	36.4	23.9
No. of Lab Tests <sup>c</sup>	8.7	8.9	8.8	6.6	11.0
-----					
Total Ambulatory Package Price	\$151.55	\$133.95	\$137.02	\$109.07	\$121.58
Coefficient of Variation	139%	134%	135%	136%	140%
-----					
Percent of Patients Hospitalized	14.1%	14.9%	16.2%	16.1%	11.9%
Total Condition Package price	\$279.95	\$258.78	\$280.00	\$249.20	\$248.07
Coefficient of Variation	191%	181%	181%	200%	213%
% of Total Price Attributed to Package Physician	63.8%	64.7%	61.9%	66.1%	67.8%

<sup>a</sup>All dollars are Medicare reasonable charges.

<sup>b</sup>Specialties shown represent 93 percent of total physician sample.

<sup>c</sup>For patients with any lab tests.

Source: Michigan 1981 Medicare Part B Claims Data.

within specialty as for the sample as a whole, suggesting that specialty-specific reimbursement would not be much more equitable on average than an all-physician payment.

Interestingly, there are no specialty differences in the percent of total price attributable to the package physician. About two-thirds of the package charges are paid directly to the package physician, encompassing both visits and diagnostic and therapeutic services. Since visits alone account for only one-fourth of total charges, we know that package physicians must be billing for the majority of ancillary services as well.

Geographic location may also influence package price, both because of geographic cost of living differences (which become institutionalized through the fee screens) and differences in referral patterns and relative physician supply. Table 8-4 compares a hypertension package across three areas corresponding to Michigan's reasonable charge localities: Detroit, other SMSAs, and rural areas. Ambulatory treatment of a hypertension patient costs 65 percent more in Detroit than in other SMSAs (\$163 vs. \$99), and more than twice as much as in nonSMSAs (\$163 vs. \$72). Although there is a slightly higher visit rate to the package physician in the urban areas, the geographic differential in cost appears primarily due to large, systematic differences in ancillary use. Hypertension patients in Detroit are more likely to visit a second physician and to receive diagnostic and therapeutic services of all kinds compared with similar patients in other SMSAs. Other SMSA patients in turn are treated more intensively than those in rural areas. Interestingly, there are no differences in hospital admission rates across areas. Of course, these geographic differences may partly reflect the concentration of higher priced, ancillary-oriented specialists in urban areas. In the following section, we examine the independent impacts of specialty and location on package price.

#### 8.4 Explaining Variation in Ambulatory Condition Package Prices:

##### Multivariate Analysis

In the preceding tables, we've seen the tremendous variation in total physician charges for ambulatory condition packages, even though diagnosis has been held constant. What are the sources of this intra-diagnosis variation and what are their independent impacts on total package price? For example, how much does the decision to order an ECG add to the total price of a hypertension package? Similarly, what are the financial implications of specialists caring for the patient as opposed to GPs?

TABLE 8-4

GEOGRAPHIC DIFFERENCES IN THREE-MONTH CONDITION PACKAGES FOR HYPERTENSION<sup>a</sup>

	Location		
	<u>Detroit</u> (63.3%)	<u>Other SMSAs</u> (16.1%)	<u>Non-SMSAs</u> (20.6%)
No. of Visits to Package Physician	2.5	2.4	2.3
Percent of Cases:			
Second Physician Involved	32.1%	26.0%	23.3%
X-Rays	27.0	24.3	18.6
ECGs	24.1	16.4	11.1
Injections	15.7	11.5	8.5
Office Surgery	18.1	11.2	8.3
Lab Tests	46.6	41.6	35.2
No. of Lab Tests <sup>b</sup>	10.4	6.3	5.0
-----			
Total Ambulatory Package Price	\$162.85	\$98.59	\$71.69
Coefficient of Variation	126%	132%	134%
-----			
Percent of Patients Hospitalized	14.5%	15.9%	15.0%
Total Condition Package Price	\$309.65	\$218.01	\$169.72
Coefficient of Variation	178%	192%	223%
% of Total Price Attributed to Package Physician	60.7%	65.4%	71.5%

<sup>a</sup>All dollars are Medicare reasonable charges.

<sup>b</sup>For patients with any lab tests.

Source: Michigan 1981 Medicare Part B Claims Data.

Regression analysis was used to explain within-package variation as a function of the specialty of the package physician, geographic location, and the different physician inputs to the care of the patient. For illustrative purposes, we present a regression table for the hypertension package only. A similar table for diabetes can be found in Appendix B (Table B 8-3).

The choice of package physician may have a major impact on total price, not only because certain specialists charge higher fees than others, but also because they may use more (or more costly) inputs. In order to examine both the direct and total (direct and indirect) effects of specialty, we employed stepwise regression techniques. First, we stepped in dummy variables for the specialty of the package physician. The  $R^2$  associated with the specialty dummies provide us with a measure of the total, or gross, contribution of specialty to package price: both the direct effect of the specialist's higher fee and the indirect effect a specialist has because of the mix of other physician services he includes in the package. Second, we stepped in dummy variables for geographic location. These regression coefficients represent both the direct effect of cost-of-living differences and the indirect effect of area treatment patterns. Finally, we stepped the other physician inputs into the regression equation. The regression coefficients associated with the specialty and location variables at this stage provide a measure of their direct effect on price alone while those on the inputs represent average unit costs (in terms of physician bills).

Although the choice of package physician does contribute to the ambulatory price for hypertension, specialty alone explains less than one half of one percent of the price variation ( $R^2 = 0.004$ , column 1, Table 8-5). GPs who are DOs add \$17.61 more to the GP-MDs' package price while general surgeons and multi-specialty group physicians cost \$24.87 and \$12.36 less, respectively. This price differential, however, is due entirely to specialty differences in visit rates and other inputs used. Once we adjust for the number of visits made to the package (and other) physicians, how many lab tests were done, etc., the specialty differences disappear entirely (column 3).

Dramatic differences are found across the geographic areas in which the packages are provided. Hypertension care costs a staggering \$89.67 more in Detroit than in rural areas, and \$22.19 more in other SMSAs. This, of course, is the total contribution of geographic area to the package price, including the effect different locations have because of cost-of-living differences, practice patterns, physician availability, etc. Once we adjust for physician



TABLE 8-5

EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR THREE-MONTH CONDITION PACKAGES:  
HYPERTENSION

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price		--	--	\$133.67
Specialty of Package Physician <sup>a</sup> :				
GP-DO	17.61***	11.82**	0.44	0.10
General Surgeon	-24.87***	-24.40***	2.34	0.06
Internist	3.02	-8.61	0.19	0.35
Medical Specialist	3.69	-5.03	2.63	0.04
Surgical Specialist	-3.81	-13.74	-3.22	0.02
Multi-Specialty Group	-12.36**	-31.42***	3.57	0.17
Other Specialist	33.28**	10.85	8.17	0.01
Location <sup>b</sup> :				
Detroit	--	89.67***	11.78***	0.63
Other SMSA	--	22.19***	-0.34	0.16
Patient is 75 years+	--	-10.68***	-4.28***	0.39
Patient is Female	--	1.99	-1.44	0.66
Patient has Second DX	--	98.87***	-6.36***	0.13
No. of Visits				
to Package Physician	--	--	10.51***	2.43
No. of Visits				
to Other Physicians	--	--	15.50***	0.56
No. of X-Rays	--	--	39.01***	0.51
No. of Lab Tests	--	--	10.33***	3.84
No. of ECGs	--	--	42.43***	0.31
No. of Injections	--	--	4.67***	0.68
No. of Office				
Surgical Procedures	--	--	39.60***	0.32
No. of Other Tests	--	--	51.70***	0.17
CONSTANT	133.95***	72.24***	-2.56	--
R <sup>2</sup>	0.004	0.09	0.84	
(df)	(7,9836)	(12,9831)	(20,9823)	
F	4.93***	78.95***	2545.62***	

<sup>a</sup>GP-MDs are in the intercept.<sup>b</sup>Rural areas are in the intercept.

\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: Michigan 1981 Medicare Part B Claims Data.

inputs, the net impact of location in SMSAs other than Detroit is zero, i.e., their gross contribution to total package price is due solely to the inputs used in these areas and not to the fees charged. In Detroit, however, physicians exact a premium for their services, above and beyond the number of visits they provide or the other services they use. Ambulatory treatment of hypertension patients in Detroit adds \$11.78 to the total price, solely because of higher physician charges. Almost \$80 (around a mean of \$133), by contrast, is attributable to a more physician-intensive treatment pattern.

All of the physician inputs add significantly to the total package price, as expected. Every time the patient visits his/her package physician, it adds \$10.51 to the bill, ceteris paribus, and every visit to a second physician adds \$15.50.

### 8.5 Out-of-Package Care

Particular difficulties may arise in administering an ambulatory condition package that is not linked to a specific acute episode of care, such as treatment for the flu. When the package encompasses several months of ongoing ambulatory care, it is likely that occasions will arise when the patient requires treatment for a condition other than the one specifically included in the package. This is particularly true for the elderly and the chronically ill. Not only do the number of chronic conditions increase with advancing age, but certain diseases predispose the individual to develop others. The obese diabetic, for example, is likely to have hypertension as well. Faced with this situation, the physician could do one of three things. First, he could refer the diabetic patient to another physician for treatment of the hypertension, resulting in an unnecessary fragmentation of care. Second, the physician could bill Medicare on a fee-for-service basis for all non-diabetes-related care thereby diluting the original packaging concept. Or, in an extreme case, the physician could claim multiple packages (diabetes, hypertension, arthritis, etc. ) for the same patient, producing a costly duplication of services. All of these responses yield a similar outcome, however: higher-than-anticipated third party payments.

In the absence of a prospective demonstration project, we can not evaluate actual physician responses. However, we can examine the frequency with which out-of-package care might occur and the attendant costs. Table 8-6 shows the percent of total Medicare reasonable charges that had various diagnoses on the bill. Almost two-thirds (63%) of the care provided under both the hypertension and diabetes packages was for a diagnosis other than the one used

TABLE 8-6

OUT OF PACKAGE CARE IN THREE-MONTH CONDITION PACKAGES

<u>Percent of Total Charges</u>	<u>Package Condition</u>	
	<u>Hypertension</u>	<u>Diabetes</u>
Hypertension - Package Physician	34.8%	3.0%
Hypertension - Other Physicians	2.1	0.9
Diabetes - Package Physician	1.3	32.9
Diabetes - Other Physicians	0.6	4.2
Chronic Ischemic Heart Disease	2.4	2.5
Congestive Heart Failure	0.6	0.6
Anemia	0.5	0.4
Other DX	36.0	33.3
No DX	21.8	22.4
-----		
Total Out of Diagnosis Care	63.1%	63.0%
-----		
Total Other Physician Care	36.4%	39.3%
-----		
Total Care Provided by Package Physician	63.6%	60.7%

Source: Michigan 1981 Medicare Part B Claims Data.

to define the package. Most of the within-package care was in fact provided by the package physician; of the 36.9 percent of charges attributable to that diagnosis for a hypertension package, for example, 34.8 percent were for services provided by the package physician and the remaining 2.1 percent by other physicians.

The extent of out-of-package care is probably over-estimated, as many claims (accounting for about one-fifth of all charges) did not have a diagnosis attached to the bill. Many of these claims were for ancillary services, especially lab tests, and probably were in fact provided to treat the package condition. However, even if we attributed all of the "no diagnosis" care to the package diagnosis, over 40 percent of charges would still be for out-of-package care.

As expected, the most common second diagnosis for diabetes patients was hypertension (3.9%), and diabetes runs a close second to chronic ischemic heart disease as additional diagnoses found in hypertension packages (1.9% and 2.4%, respectively). No other single diagnosis accounted for even one percent of charges, leaving at least one-third of the package price attributable to a wide variety of other conditions.

The sheer magnitude of out-of-package care (\$84 and \$88 on average for the hypertension and diabetes packages, respectively, around means of \$133 and \$140) implies a tremendous potential for package fragmentation. The package physician, however, is directly responsible for almost two-thirds of all charges (61-64%) and is probably indirectly responsible for a great deal more, e.g., tests which he orders but which are performed and billed by an independent lab. This suggests that packaging (or capitating) total ambulatory patient care for a specified time period might be more feasible and less subject to abuse than a condition-specific package. Some type of casemix adjustment would still have to be made, however.

#### 8.6 Assignment Patterns in Ambulatory Condition Packages

The ambulatory condition packages include an average of 10 bills for a variety of visits and services provided by the package (as well as other) physicians. Under current Medicare law, physicians may opt to accept assignment not only on a patient by patient basis but also on a claim by claim basis. In Michigan, however, most physicians appear to make their decision on a patient basis. In about 45 percent of all hypertension packages, the package physician accepts assignment for all bills he submits for a given patient while in another 45 percent of cases, he declines to take assignment

on any claims. In the remaining 10 percent of patients, the package physician accepts assignment on a claim by claim basis. In these instances, roughly 50 percent of charges are assigned.

The total ambulatory package price for hypertension varies tremendously as a function of whether the package physician accepts assignment, as seen in Table 8-7. (A comparable table for diabetes packages is shown in Table B 8-4. Assignment patterns are virtually identical to those for hypertension.) Packages where the physician always takes assignment average 62 percent more than when the physician never does (\$152 vs. \$94), primarily because of heavier use of ancillary services (except lab tests). Hypertension patients taken on assignment, for example, are almost twice as likely to receive an ECG than those not accepted on assignment (20% vs. 12%). When some claims are assigned and others not (within the same package), the total price for ambulatory care is \$229, 50 percent more than those in the "always" group and one and one-half times more than those in the "never" group. Higher prices for these packages are due to both higher visit rates to the package physicians and more intensive ancillary utilization.

Since our unit of analysis is the package (or beneficiary) rather than the physician, we don't know whether these differences reflect differences in the practice styles of physicians who do or do not take assignment, or whether they reflect decisions made at the case level based on expected service utilization. It does appear that patients in the "sometimes" group are sicker, as they are twice as likely to be hospitalized during the three month package period, compared with other patients.

Although the absolute dollar amount is higher, the percent of the package price attributed to the package physician is not any different for patients in the "sometimes" group than for other patients. By comparing the last two rows for each group in Table 8-7, we can see that the charges attributable to other physicians (including independent labs) are usually always taken on assignment. For example, in the first group 24 percent of total package charges are assigned, even though the package physician accepts no claims on assignment. Since the package physician accounts here for 63 percent of the total on average, we derive a residual of only 13 percent of other physicians' charges that go unassigned ( $100-63-24=13\%$ ).

## 8.7 Summary and Conclusions

We examined ambulatory condition packages for two chronic illnesses common to the Medicare population: hypertension and diabetes. Charges for

TABLE 8-7

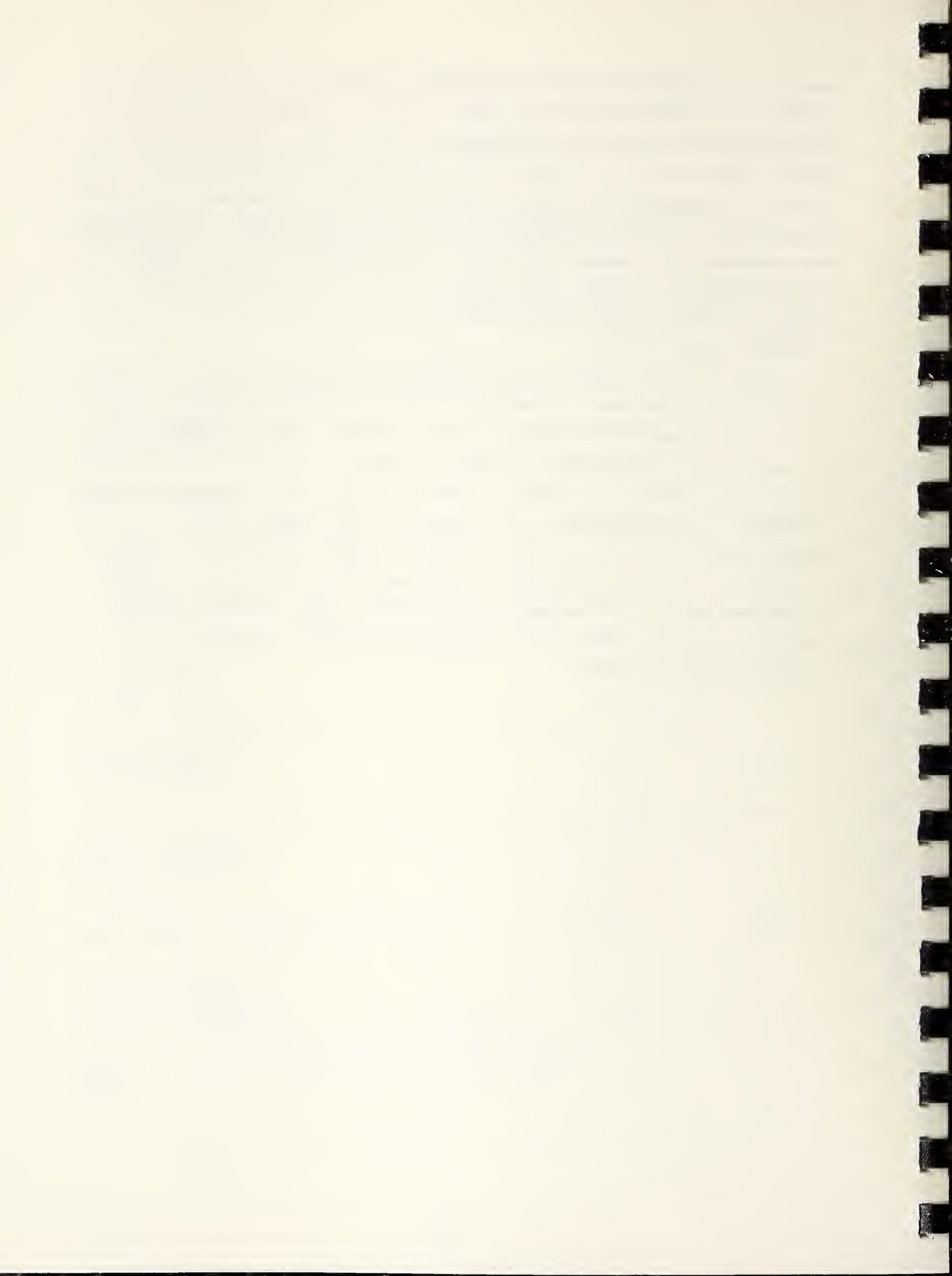
VARIATIONS IN PRICE AND INPUTS AS A FUNCTION OF PACKAGE PHYSICIAN'S WILLINGNESS TO TAKE ASSIGNMENT: THREE-MONTH CONDITION PACKAGE FOR HYPERTENSION

	Package Physician Accepts Assignment		
	Never (44.7%)	Sometimes (10.1%)	Always (45.2%)
No. of Visits to Package Physician	2.2	3.2	2.5
Percent of Cases:			
Second Physician involved	29.5%	25.8%	29.8%
X-rays	14.8	27.5	20.0
ECGs	11.6	60.1	19.8
Injections	7.9	19.0	17.9
Office Surgery	11.0	23.3	16.9
Lab Tests	41.9	64.2	40.4
Other Tests	5.5	14.5	10.8
-----			
Total Ambulatory Package Price	\$93.77	\$229.41	\$151.82
-----			
Percent of Patients Hospitalized	14.2%	27.1%	12.7%
Total Condition Package Price	\$223.87	\$442.55	\$179.97
% of Total Package Taken on Assignment	23.6%	70.5%	97.3%

Source: Michigan 1981 Medicare Part B Claims Data.

ambulatory physician services averaged \$134-140 over a three month period. Visits to the package physician accounted for only one-fourth of the total package price; the remainder was attributable to a wide range of ancillary services, particularly lab tests. The range in charges was staggering, however, from \$7 to \$3,400 with a coefficient of variation exceeding 135 percent. Under this type of package, physicians would probably end up being either significantly under-or over-paid in nearly every case. Nor would specialty-specific payment rates be any more equitable; suprisingly, the specialty of the package physician explained virtually none of the variation in package price.

A major problem with this type of package is the extent of out-of-package or out-of-condition care. Almost two-thirds of the services provided under both the hypertension and diabetes packages was for a diagnosis other than the one used to define the package. Physicians might bill fee-for-service for all non-package related care in these instances, or they could even claim multiple packages for the same patient. The package physician, however, was responsible not only for all of the in-scope services but for half of the out-of-package care as well, billing for about two-thirds of all charges during the package period. This suggests that packaging total ambulatory patient care for a specified time period might be more feasible than a condition-specific package.





## 9.0 INPATIENT CONDITION PACKAGES (OR "PHYSICIAN DRGS")

### 9.1 Overview and Research Questions

Inpatient condition packages have a certain intuitive appeal, because the payment unit (i.e., hospitalization) can be easily and objectively defined. Under this packaging arrangement, all physician services for inpatient care would be combined with a single bill and a lump sum payment made. This payment could be made to the physician primarily responsible for admitting the patient, who would then reimburse whatever other physicians were involved, but other alternative approaches are possible. Payment could be made directly to the hospital which in turn would pay the physicians. Alternatively, pro rata shares of the case payment could be disbursed directly to each physician by the insurer. For now, we assume that payment for inpatient condition packages is made to the surgeon or attending physician.

Because of the tremendous variation in medical problems treated in the hospital, some sort of casemix adjustment is clearly necessary. The obvious approach is to use diagnosis, either alone or in modified form, e.g., diagnosis-related groups (DRGs).<sup>\*</sup> The use of DRGs as casemix adjustors for inpatient condition packages has particular appeal, since the institutional (Part A) costs of hospitalization are now being paid on the same basis.

In this chapter, we directly compare diagnoses with DRGs, asking

- (1) Do DRGs successfully "define" individual packages compared with diagnoses alone, or is there as much variation in resource use within DRG packages as between?

In addition, we examine the following questions:

- (2) What is the range and mix of physician services associated with a hospital episode? How many different physicians are involved?
- (3) Do certain conditions produce a more homogeneous inpatient package, in terms of resource use, than others, e.g., surgical vs. medical conditions?
- (4) What impact does the specialty of the surgeon or attending physician have on total costs? Do certain specialties drive up costs because they charge higher fees or because they utilize more (or more expensive) inputs?

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<sup>\*</sup>Alternative classification systems are available, (see, for example, Horn and Schumacher, 1982; Young, et al., 1982), but they require data elements not currently reported on Medicare claims.

## 9.2 Constructing DRG and Diagnosis-Based Episodes of Care

Since only Part B claims were available for this analysis, it was not possible to determine the primary diagnosis or principal reason for admission. Instead, we had a variable number of physician claims for every patient which often included multiple diagnoses and multiple surgical procedures. Three strategies were used to construct hospital episodes. First, medical condition packages were defined according to the following criteria:

- (1) The package diagnosis must be included in a claim submitted for a consult or for a routine inpatient visit. This prevented patients from being included in a pneumonia package, for example, solely because they had a chest x-ray claim with that diagnosis attached.
- (2) The patient must not have had any surgery that would have grouped him/her in a surgical DRG.

Two medical condition packages, pneumonia and cerebrovascular disease, were constructed in this way but it proved impossible to create similar inpatient packages for hypertension and diabetes. These are such common complicating conditions, especially among the elderly, that hospitalizations primarily for those specific diagnoses could not be identified with any confidence.

Second, for two less complex surgical procedures (cardiac catheterization and pacemaker insertion), patients were classified in those packages only if they did not have other major surgery. Excluded are those procedures done secondary to another operation, e.g., cardiac catheterization performed prior to a coronary artery bypass graft. Thus, the catheterization and pacemaker packages represent those cases in which the index procedure was the primary reason for hospitalization.

Third, the remaining surgical packages (seven in all) were defined based on the procedure itself (as reported by the surgeon).\* In a number of cases, patients were found to have had multiple surgical procedures. This occurred fairly infrequently for specialized operations like hip replacement and lens extraction, but was more common among general surgical procedures. Over one-fourth (28%) of all cholecystectomy patients had undergone a second

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\*Tables for four of these procedures are not shown in this chapter. They can be found in Appendix B 9: hip reconstruction and replacement, hernia repair, coronary artery bypass graft, and prostatectomy.

surgical procedure, for example. In two-thirds of these cases, the second surgery was either diagnostic or minor in nature, while the remaining patients (8% of the total sample) had major surgery, operations as complex in nature as a cholecystectomy. The latter cases were dropped from the analysis (as were similar multiple surgeries in other packages), on the presumption that the cholecystectomy may not have been the primary reason for admission. Deleting these cases invariably reduced within-package variation considerably while having little effect on average package price.

This approach, however, fails to resolve the question of what is the appropriate DRG for patients with multiple surgery, particularly unrelated surgery. Consider the hospital utilization history in Table 9-1. The patient was admitted to the hospital and followed for two weeks by an internist. During this period, he received two unrelated, but expensive, diagnostic surgical procedures from three different physicians: aortography performed by a cardiologist (with x-ray interpretation by the radiologist), and an upper GI endoscopy done by a general surgeon. Five days later, this same surgeon performed a cholecystectomy. Then on the third post-operative day, a urologist took over the routine hospital care of the patient. Should this hospital admission be considered a cholecystectomy DRG? The general surgeon would probably argue no; the cholecystectomy-related charges account for only 42 percent of the total bill. Even adding in the upper GI endoscopy charge, about one-half of the total inpatient charges remain unexplained. But if this is not a cholecystectomy DRG, then what is it? The attending internist reported a diagnosis of hypertensive heart disease, which may thus account for the diagnostic cardiac procedure. But is a circulatory system DRG any more appropriate?

### 9.3 Variation in Physician Charges and Inputs

#### 9.3.1 Variation by DRG

Four conditions were selected to illustrate inpatient condition packages based on DRGs: two surgical (cholecystectomy and transurethral resection of the prostate) and two medical (pneumonia and cerebrovascular disease). Table 9-2 shows the physician charges and inputs associated with a cholecystectomy package. As in previous chapters, all dollars are Medicare reasonable charges. The numbers in parentheses represent the relative frequency with which a physician component is included; a surgeon and anesthesiologist are necessary inputs for the performance of a cholecystectomy, but an assistant

TABLE 9-1

## EXAMPLE OF UNRELATED MULTIPLE SURGERIES FOR A CHOLECYSTECTOMY PATIENT

<u>Date of Service</u>	<u>Procedure</u>	<u>Reasonable Charge</u>	<u>Provider</u>
6/29/81	ECG	\$ 6.38	Staff Cardiologist
6/29/81	Chest x-ray	12.00	Radiologist
6/30/81	Initial Consultation	58.03	Internist
7/01/81	Follow-up Hospital Visits (13 days)	195.00	Internist
7/01/81	Abdominal x-rays	13.00	Radiologist
7/07/81	Aortography	75.00	Radiologist
7/07/81	Intro of Catheter, aorta	100.00	Cardiologist
7/07/81	Intro of Catheter, coronary artery	466.13	Cardiologist
7/08/81	Upper GI endoscopy	250.00	Surgeon
7/13/81	Cholecystectomy	650.00	Surgeon
7/13/81	Cholecystectomy	130.00	Asst. Surgeon
7/13/81	Cholecystectomy	162.50	Anesthesiologist
7/13/81	Operative Cholangiography	19.15	Radiologist
7/16/81	Initial Consultation	47.29	Urologist
7/17/81	Urography	29.00	Radiologist
7/17/81	Follow-up Hospital Visits (7 days)	85.89	Urologist
	TOTAL PRICE	<u>\$2,299.37</u>	

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 9-2

INPATIENT CONDITION PACKAGES FOR CHOLECYSTECTOMY: BY DRG AND ALL CASES<sup>a</sup>

	With Common Bile Duct Exploration		Without Common Bile Duct Exploration		All Cases (n = 1,160)
	DRG#195 With C.C. b (15.7%)	DRG#196 No C.C. (8.3%)	DRG#197 With C.C. (50.3%)	DRG#198 No C.C. (25.7%)	
Surgeon	\$703 (1.00)	\$672 (1.00)	\$592 (1.00)	\$582 (1.00)	\$614 (1.00)
Assistant Surgeon	142 (0.34)	140 (0.26)	118 (0.28)	116 (0.24)	124 (0.28)
Anesthesiologist	176 (1.00)	185 (1.00)	138 (1.00)	150 (1.00)	151 (1.00)
Other Surgery <sup>c</sup>	250 (0.25)	145 (0.11)	171 (0.22)	135 (0.13)	177 (0.19)
Routine Hospital Visits	228 (0.62)	177 (0.40)	173 (0.55)	123 (0.31)	176 (0.48)
Concurrent Care Visits	139 (0.09)	123 (0.01)	114 (0.09)	68 (0.01)	118 (0.06)
ICU Visits	105 (0.12)	89 (0.06)	119 (0.08)	95 (0.03)	111 (0.07)
Consultations	62 (0.37)	47 (0.18)	58 (0.33)	64 (0.13)	59 (0.27)
X-Rays	115 (0.88)	98 (0.70)	83 (0.82)	73 (0.60)	88 (0.76)
ECGs	13 (0.74)	10 (0.58)	12 (0.78)	9 (0.65)	12 (0.73)
Lab Tests	55 (0.18)	62 (0.20)	41 (0.05)	44 (0.11)	48 (0.08)
Other Services	64 (0.18)	64 (0.06)	73 (0.10)	92 (0.03)	73 (0.07)
Total Package Price	\$1,297	\$1,087	\$1,020	\$885	\$1,034
Coefficient of Variation	27.6%	22.2%	27.0%	25.6%	29.5%

<sup>a</sup> All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses. Excludes 142 cases who had a second major operation. This lowered the total package price from \$1,122 to \$1,034 and reduced the C.V. from 41% to 30%.

<sup>b</sup> C.C. = complicating condition.

<sup>c</sup> Includes all physicians' fees.

Source: South Carolina 1981 Medicare Part B Claims Data.

surgeon is discretionary. In South Carolina, for example, an assistant surgeon is used 28 percent of the time. The total package price is a weighted average of all physician charges for the inpatient stay.

The total sample of cholecystectomies has been classified in the four DRGs, depending on whether a common bile duct exploration was performed at the time and whether the patient has substantial complicating conditions (C.C.).\* There is a wide range in the total package price, from \$885 for the simplest DRG (#198) to \$1,297 for the most complex (#195). There is only a minor difference between the two middle DRGs, however, with the higher surgeons' fees associated with a common bile duct exploration in DRG #196 being offset by the more frequent use of visits and consultations in DRG #197, presumably to treat those "complicating conditions."

Although average package prices do vary across DRGs as we might expect, there remains almost as much variation within each DRG package as there is for all cases combined. This is undoubtedly due to the tremendous variation in the number and type of other physician services involved during the hospital stay. Even after eliminating those patients with a second major operation, about one-fifth of the sample underwent an additional surgical procedure for an average charge of \$177. Even more startling is the number of patients with routine hospital visits and concurrent care visits,\*\* ICU visits, and consultations. Nearly one-half of cholecystectomy patients, for example, received routine daily visits from their family internist or general practitioner. These visits (as well as visits of other types and consultations) were all in addition to the follow-up care that was to be provided by the surgeon who performed the cholecystectomy. This means that the surgeon's share of the total bill is considerably smaller than we might have expected (although still the single largest cost on average). Non-surgeons (including anesthesiologist and radiologists) account for one-third to almost half of the total package price, depending on DRG.

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\*Strictly speaking, DRGs #195 and 196, and DRGs 197 and 198 distinguish between patients with complicating conditions or 70 years or older versus those younger than 70 and without complicating conditions. Unfortunately, South Carolina claims do not include beneficiary age, so that these DRGs and those for the TURPs that follow are approximate.

\*\*The Part B carrier uses concurrent care to identify routine hospital visits provided by a second physician, i.e., when two physicians are providing basic follow-up care at the same time (for different medical problems).

In contrast to cholecystectomy, DRG packages for transurethral resection of the prostate (TURP) do not look any different from an all-TURP package (see Table 9-3). Although patients with complicating conditions (DRG #336) do appear to utilize physician services more intensively, their package price is only slightly higher than that of patients in DRG #337, \$999 vs. \$962. Disaggregating the TURP package into two DRGs, furthermore, has only a negligible impact on intra-package variation.

While surgical condition packages display considerable price variation (C.V.s generally average 25-40 percent),\* they are remarkably homogeneous when compared with medical condition packages. Table 9-4 presents an example with pneumonia. Although the average package price is quite low (\$322 per admission), the range in price is staggering, from \$50 to \$6000, with a coefficient of variation of 122 percent. Separating pneumonia patients into DRGs does yield two quite different prices, however. Patients who are 70 years or older and/or have complicating conditions (DRG #89) cost 37 percent more than those who are younger and less ill, \$339 vs. \$247. There is just as much variation within each DRG package, suggesting that physicians would end up being either significantly under- or over-paid in nearly every case. It is possible, however, that much of this variation in input mix and charges is due to the physician specialty treating the patient; if so, then specialty-specific payment rates might prove more equitable. We explore this directly in Section 9.4.

The four DRG packages associated with cerebrovascular disease also yield four very different prices, ranging from \$438 to \$743 per admission, suggesting that the DRG classification may be capturing real differences in treatment patterns (see Table 9-5). Even so, within-DRG variation remains tremendous with C.V.s close to 100 percent.

Why do we observe so much more variation in these medical condition packages? One reason may be the multiplicity of specialties involved. Surgical condition packages are usually managed by physicians in the same specialty, or at most two specialties. TURPs, for example, are performed almost exclusively by urologists, while general surgeons account for 89 percent of the cholecystectomies with thoracic surgeons doing most of the remainder. Not only do physicians in the same (or related) specialties charge similar fees, but they also are apt to use similar inputs from other physicians. By contrast, attending physicians come from a wide

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\*See also Tables 9-6 and 9-8 in this chapter and Tables B 9-1 to B 9-4 in Appendix B.

TABLE 9-3

 INPATIENT CONDITION PACKAGES FOR TRANSURETHRAL RESECTION OF THE PROSTATE  
 (TURP): BY DRG AND ALL CASES<sup>a</sup>

	DRG #336 With C.C. (66%)	DRG #337 No C.C. (34%)	All Cases (n = 2,182)
Surgeon	\$686 (1.00)	\$682 (1.00)	\$685 (1.00)
Assistant Surgeon <sup>b</sup>	--	--	--
Anesthesiologist	104 (1.00)	112 (1.00)	107 (1.00)
Other Urinary Surgery	159 (0.32)	157 (0.22)	158 (0.28)
Other Surgery	191 (0.06)	159 (0.07)	180 (0.06)
Routine Hospital Visits	154 (0.37)	140 (0.25)	150 (0.33)
Concurrent Care Visits	125 (0.11)	113 (0.03)	124 (0.09)
ICU Visits	99 (0.02)	132 (0.02)	110 (0.02)
Consultations	54 (0.37)	57 (0.23)	55 (0.33)
X-Rays	51 (0.80)	60 (0.66)	54 (0.78)
ECGs	10 (0.83)	9 (0.77)	10 (0.81)
Lab Tests	29 (0.01)	57 (0.30)	56 (0.10)
Other Services	62 (0.07)	98 (0.04)	69 (0.06)
-----			
Total Package Price	\$999	\$962	\$988
Coefficient of Variation	24.4%	24.7%	25.1%

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses. Sample excludes 118 cases that had a major second operation. This lowered the average package price from \$1,031 to \$988; and reduced the C.V. from 33% to 25%.

<sup>b</sup>Assistant used less than one percent of the time.

Source: South Carolina 1981 Medicare Part B Claims Data.



TABLE 9-4

INPATIENT CONDITION PACKAGES FOR PNEUMONIA DRGs<sup>a</sup>

	DRG #89 C.C. or Age 70+ (81%)		DRG #90 No C.C., Age < 70 (19%)		All Cases (n = 5,335)	
Medical Emergency	\$ 33	(0.14)	\$ 30	(0.08)	\$ 33	(0.13)
Other Surgery <sup>b</sup>	293	(0.13)	326	(0.09)	298	(0.12)
Routine Hospital Visits	206	(0.98)	163	(0.97)	198	(0.98)
ICU Visits	191	(0.09)	175	(0.05)	189	(0.08)
Consultations	89	(0.27)	85	(0.16)	88	(0.25)
Chest X-ray	28	(0.53)	23	(0.48)	27	(0.52)
Other Diag. X-rays	47	(0.19)	39	(0.14)	46	(0.18)
Body Scan	27	(0.02)	27	(0.02)	27	(0.02)
Lung Scan	70	(0.02)	49	(0.02)	67	(0.02)
Lung Perfusion Study	79	(0.01)	60	(0.01)	75	(0.01)
Other Nuclear Med. Tests	134	(0.06)	116	(0.04)	132	(0.06)
ECGs	29	(0.48)	22	(0.38)	28	(0.46)
Other Tests	63	(0.09)	56	(0.06)	62	(0.08)
-----						
Total Package Price	\$339		\$247		\$322	
Coefficient of Variation	120%		133%		122%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

<sup>b</sup>Includes minor and diagnostic surgery only, e.g., bronchoscopy, thoracentesis, etc.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE 9-5

INPATIENT CONDITION PACKAGES FOR CEREBROVASCULAR DISEASE: BY DRG AND ALL CASES<sup>a</sup>

	Specific Cerebrovascular Disease		Non-Specific Cerebrovascular Disease			All Cases (n = 3,741)
	DRG #14 No TIA <sup>b</sup> (52.8%)	DRG #15 TIA (27.1%)	DRG #16 With C.C. (5.7%)	DRG #17 No C.C. (14.4%)		
Medical Emergency	\$ 31 (0.16)	\$ 35 (0.14)	\$ 27 (0.25)	\$ 32 (0.08)	\$ 30 (0.15)	
Surgery <sup>c</sup>	304 (0.15)	366 (0.14)	343 (0.24)	336 (0.15)	327 (0.15)	
Routine Hospital Visits	323 (0.97)	217 (0.98)	366 (0.99)	210 (0.98)	281 (0.98)	
ICU Visits	139 (0.29)	135 (0.13)	143 (0.27)	135 (0.15)	138 (0.23)	
Consultations	112 (0.49)	100 (0.46)	121 (0.64)	107 (0.32)	109 (0.46)	
Chest X-Ray	18 (0.53)	53 (0.47)	21 (0.54)	15 (0.46)	17 (0.50)	
Aortograms/Arteriograms	97 (0.06)	109 (0.11)	87 (0.04)	106 (0.07)	103 (0.07)	
Intra-aortic Intro. Procedures	292 (0.04)	337 (0.08)	263 (0.04)	345 (0.05)	318 (0.05)	
Other Diag. X-Rays	35 (0.32)	40 (0.36)	54 (0.44)	47 (0.35)	39 (0.34)	
CAT Scan-Head	104 (0.18)	102 (0.15)	102 (0.14)	99 (0.09)	103 (0.16)	
Brain Scan	78 (0.06)	59 (0.06)	73 (0.03)	73 (0.05)	72 (0.06)	
Cerebral Blood Flow Studies	99 (0.18)	91 (0.22)	97 (0.21)	98 (0.15)	96 (0.19)	
Other Nuclear Medicine Tests	70 (0.11)	64 (0.11)	136 (0.13)	89 (0.12)	75 (0.11)	
ECGs (Routine and Special)	35 (0.68)	48 (0.70)	57 (0.75)	38 (0.59)	40 (0.67)	
Special Studies (VEGs, Ultra-Sound, etc.)	51 (0.34)	47 (0.37)	56 (0.41)	52 (0.25)	50 (0.34)	
Other Services	88 (0.05)	52 (0.05)	70 (0.06)	84 (0.03)	76 (0.05)	
Total Package Price	\$ 594	\$491	\$743	\$ 438	\$ 548	
Coefficient of Variation	101.8%	95.6%	85.5%	101.0%	101.6%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each service is in parentheses.

<sup>b</sup>TIA = Transient Ischemic Attack.

<sup>c</sup>Includes minor and diagnostic surgery only.

Source: Michigan 1981 Medicare Part B Claims Data.

range of specialties. In Michigan, for example, cerebrovascular disease is handled by internists in 48 percent of the cases and by general practitioners in another 20 percent. The remaining third of the patients are treated by a diverse group, including osteopaths, neurologists, cardiologists, general surgeons, and neurosurgeons. Neurosurgeons presumably not only charge more than general practitioners but also prescribe a different mix of other physician inputs. One could argue that the neurosurgeon is treating a different case, perhaps a sicker patient than is the general practitioner, but this would mean that the DRGs are not appropriate measures of casemix severity. (There were no differences in specialty mix across DRGs for either pneumonia or cerebrovascular disease.)

A second reason for differences between medical and surgical conditions may lie in the extent to which certain physician inputs are fixed. Surgical condition packages always include both a surgeon and anesthesiologist; together these two account for well over half of total package price. The only fixed input for medical condition packages, on the other hand, is the attending physician (whose bill is included under routine hospital visits). Even this input will vary tremendously, however, as a function of length of stay. In addition, there are a large number of diagnostic tests done on a relatively small number of patients but at a very high cost. Arteriograms, CAT scans of the head, and cerebral blood flow studies were performed in less than one-fifth of all cerebrovascular disease patients (see Table 9-5). Yet each one of these tests added about \$100 to the package price, which averaged only \$548.

Are "physician DRG" inpatient condition packages statistically different from one another? The answer is yes; but DRGs still explain only a small percentage of package price variation in the condition as a whole, as shown below:

<u>Condition</u>	<u>Percent Variation Attributable to DRGs</u>
Cholecystectomy	18.2%
TURP	0.5
Pneumonia	0.9
Cerebrovascular Disease	1.9

Except for cholecystectomies, the DRG groups explained less than 2 percent of the variation in physician charges! The relatively better performance of cholecystectomy DRGs probably reflects the concrete, objective nature of a common bile duct exploration (as opposed to complicating conditions) and the fact that it is always associated with a higher surgeon's fee.

### 9.3.2 Variation by Specialty and Geographic Location

The specialty of the attending physician may explain some differences in package content and price. Table 9-6 compares a pacemaker package across specialties. Pacemaker insertion is a particularly interesting procedure, as it is commonly performed by non-surgeons as well. Although the total package price does not vary much based on the specialty of the physician inserting the pacemaker, the mix of inputs varies tremendously. General and thoracic surgeons, for example, are more likely to perform other minor surgery during the hospital stay, while cardiologists are more likely both to use an anesthesiologist during the insertion procedure and to order (or perform) diagnostic cardiac services. Under packaging, the physician would face a definite incentive to utilize fewer other inputs, either their own or those of other physicians. Cardiologists may have greater flexibility in this regard, as their services currently account for a larger share of the package price (77% versus 70% for surgeons).

Fairly large specialty differences in package price are observed for left heart catheterization (Table 9-7). The package costs 26 percent more when a cardiologist performs the catheterization than when an internist does, and 34 percent more for a multi-specialty group physician (probably also a cardiologist). Higher package prices appear to be partly due to more visits and consults, but also to a higher price for the procedure itself (cardiac catheterization #1 in Table 9-7).<sup>\*</sup> As it turns out, internists are more likely to perform simpler, less expensive procedures (e.g., catheterization without angiography); there are no specialty differences in total package price, once we adjust for the type of catheterization performed (see Table B 9-7).

Besides specialty training, the physician's style of practice may also affect the content of inpatient condition packages. Differences in practice style reflect not only individual idiosyncracies, but also referral patterns and relative physician supply. We proxy the latter by comparing lens extraction packages in two states (Table 9-8). Physician payments for this package average 44 percent more in Michigan than in South Carolina, \$1,657 versus \$1,150. Only ten percentage points of this difference is due to

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<sup>\*</sup>The primary package procedure consists of left heart and combined right and left heart catheterizations. In a small percent of cases, the physician performed a second left heart catheterization (catheterization #2) or an independent right heart catheterization. Each of these adds greatly to the total package price.

TABLE 9-6

INPATIENT CONDITION PACKAGES FOR PERMANENT TRANSVENOUS PACEMAKER INSERTION<sup>a</sup>

Physician Component	Specialty of Physician Inserting Pacemaker (percent of claims)			
	General Surgeon (59%)	Thoracic Surgeon (25%)	Cardiologist (11%)	All Physicians <sup>b</sup>
Surgeon	\$669 (1.00)	\$661 (1.00)	\$700 (1.00)	\$665 (1.00)
Anesthesiologist	130 (0.20)	146 (0.26)	153 (0.72)	141 (0.26)
Assistant Surgeon	127 (0.03)	-- (0.00)	-- (0.00)	127 (0.02)
Operative Fluoroscopy	27 (0.19)	36 (0.09)	-- (0.00)	29 (0.14)
Temporary Pacemaker <sup>c</sup>	240 (0.10)	273 (0.12)	215 (0.11)	244 (0.11)
Pacemaker Repair <sup>c</sup>	261 (0.02)	337 (0.02)	255 (0.06)	274 (0.02)
Other Surgery <sup>d</sup>	188 (0.08)	234 (0.08)	88 (0.01)	202 (0.07)
Routine Hospital Visits	171 (0.76)	164 (0.72)	133 (0.61)	165 (0.72)
ICU Visits	134 (0.34)	142 (0.28)	146 (0.34)	137 (0.32)
Concurrent Care Visits	135 (0.05)	40 (0.06)	84 (0.11)	99 (0.05)
Consultations	58 (0.27)	64 (0.28)	58 (0.18)	61 (0.26)
Cardiac Catheterization	293 (0.02)	369 (0.03)	364 (0.15)	346 (0.04)
ECGs	29 (0.73)	21 (0.81)	16 (0.89)	25 (0.76)
Other Cardiac Services <sup>e</sup>	83 (0.25)	49 (0.30)	78 (0.55)	71 (0.30)
X-Rays	50 (0.80)	47 (0.85)	40 (0.81)	48 (0.80)
Other Physician Services	98 (0.08)	20 (0.07)	63 (0.08)	65 (0.10)
-----				
Total Package Price	\$1,043	\$1,023	\$1,150	\$1,035
Coefficient of Variation	34.7%	32.1%	28.9%	34.6%

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

<sup>b</sup>Specialties shown represent 95% of all pacemaker claims (n = 649).

<sup>c</sup>Surgeon's fee only.

<sup>d</sup>Diagnostic and minor surgery only. Includes fees for all physicians.

<sup>e</sup>Includes cardiovascular stress testing, special ECGs, echocardiography, and intracardiac electrophysiological procedures.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 9-7

INPATIENT CONDITION PACKAGES FOR LEFT HEART CATHETERIZATION<sup>a</sup>

Physician Component	Specialty of Physician Performing Catheterization <sup>b</sup> (percent of claims)				All Physicians
	Cardiologist (65.1%)	Internist (19.3%)	Multi-Specialty Group (14.6%)		
Cardiac Catheterization #1	\$516 (1.00)	\$442 (1.00)	\$527 (1.00)	\$500 (1.00)	
Cardiac Catheterization #2	380 (0.02)	475 (0.01)	272 (0.03)	369 (0.02)	
Right Heart Catheterization	172 (0.03)	200 (0.01)	35 (0.01)	162 (0.02)	
Injection Procedures for Catheterization	85 (0.03)	112 (0.04)	75 (0.01)	88 (0.03)	
Routine Hospital Visits	153 (0.92)	121 (0.80)	159 (0.70)	148 (0.86)	
Concurrent Care Visits	93 (0.07)	--	131 (0.05)	99 (0.05)	
ICU Visits	143 (0.24)	85 (0.16)	196 (0.22)	146 (0.22)	
Consultations	63 (0.27)	64 (0.23)	58 (0.33)	62 (0.27)	
Catheterization X-Rays	75 (0.12)	58 (0.20)	77 (0.07)	70 (0.13)	
Cardiac Nuclear Imaging	49 (0.07)	30 (0.01)	34 (0.09)	45 (0.06)	
Other X-Rays	41 (0.84)	37 (0.84)	36 (0.88)	40 (0.84)	
ECGs	14 (0.85)	15 (0.81)	20 (0.86)	15 (0.84)	
Stress Tests	34 (0.08)	34 (0.24)	33 (0.13)	34 (0.11)	
Echocardiography	50 (0.09)	33 (0.05)	52 (0.32)	49 (0.12)	
Other Services	303 (0.18)	240 (0.14)	288 (0.39)	297 (0.21)	
Total Package Price	\$851	\$677	\$910	\$825	
Coefficient of Variation	58.3%	41.7%	73.5%	60.4%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

<sup>b</sup>Specialties shown represent 99% of all left heart catheterization claims (N=522)

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 9-8

 INPATIENT CONDITION PACKAGES FOR LENS EXTRACTION:  
 COMPARISONS OF SOUTH CAROLINA AND MICHIGAN PROCEDURES<sup>a</sup>

	South Carolina (n = 3,083)		Michigan (n = 10,124)	
Surgeon	\$943	(1.00)	\$1,269	(1.00)
Assistant Surgeon	211	(0.03)	310	(0.28)
Anesthesiologist	156	(1.00)	179	(1.00)
Other Eye Surgery	346	(0.05)	477	(0.14)
Other Surgery <sup>b</sup>	277	(0.01)	447	(0.02)
Routine Hospital Visits	77	(0.06)	102	(0.14)
Concurrent Care Visits	58	(0.02)	n.a.	
Consultations	50	(0.09)	74	(0.20)
X-Rays	15	(0.53)	15	(0.34)
ECGs	8	(0.65)	13	(0.57)
Lab Tests	10	(0.01)	26	(0.01)
Other Services	138	(0.02)	69	(0.06)
-----				
Total Package Price	\$1,150		\$1,657	
Coefficient of Variation	25.9%		33.2%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

<sup>b</sup>Includes a small number of cases (less than 1%) that had a second major (non-eye) operation. Excluding them had no impact on either average prices or within-package variation.

Source: South Carolina and Michigan 1981 Medicare Part B Claims Data.

geographic cost-of-living differences. Lens extractions cost more in Michigan because of the significantly higher use of other inputs.\* Michigan ophthalmologists use an assistant surgeon in 28 percent of all operations versus only 3 percent in South Carolina. They are also far more likely to perform additional eye surgery. About one-fifth of these operations are a second (unilateral) lens extraction done during the same admission for an added marginal cost of \$793. (Unlike CPT-4, the Michigan procedural coding system distinguishes between unilateral and bilateral extractions.) Patients in Michigan are more than twice as likely to have non-surgeons involved in their care, either as attendings or consultants, than are similar patients in South Carolina.

What implications do these differences have for payment under inpatient condition packages? For policy purposes, they suggest that a national reimbursement rate may not be acceptable and that some regional adjustment may be necessary. Careful consideration would need to be given to this approach, however. Use of other physician inputs in some areas (like Michigan) may be inefficient, and it may not be desirable to incorporate such inefficiencies into the package rates.

#### 9.4 Explaining Variation in Inpatient Package Prices: Multivariate Analysis

From earlier tables, we've seen that there is tremendous variation in total physician charges for inpatient condition packages, even after adjusting for DRG. What are the sources of this intra-DRG variation and what are their independent impacts on total package price? For example, how much does the decision to use an assistant surgeon add to the total price of a cholecystectomy package? Similarly, what are the financial implications of multiple physicians caring for the patient concurrently?

Regression analysis was used to explain within-package variation as a function of the specialty of the surgeon or attending physician, and of the different physician inputs used in the care of the patient. For illustrative purposes, we present regression tables for two of the packages: one surgical (cholecystectomy) and one medical (cerebrovascular disease). Similar tables for the remaining packages can be found in Appendix B (Tables B 9-5 to B 9-8).

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\*Multivariate analysis of variance (MANOVA) was used to test the differences in cost shares (i.e., proportion of the total price attributable to surgeon, anesthesiologist, attending, etc.) between states. The difference was significant at the 0.0001 level ( $F = 204.24$ ).



Within a given package, the choice of attending physician may have a major impact on total price, not only because certain specialists charge higher fees than others, but also because they may use more (or more costly) inputs. In order to examine both the direct and total (direct and indirect) effects of specialty, we employed stepwise regression techniques. First, we stepped in dummy variables for the specialty of the attending physician. The  $R^2$  associated with the specialty dummies provide us with a measure of the total, or gross, contribution of specialty to package price: both the direct effect of the specialist's higher fee and the indirect effect a specialist has because of the mix of other physician services he includes in the package. We then stepped the other physician inputs into the regression equation. The regression coefficients associated with the specialty variables at this stage provide a measure of their direct effect on price alone while those on the inputs will be their average unit cost (in terms of physician bills). The increase in the  $R^2$  tells us how much of the variation in package price is due to within-specialty variation in input use.

The choice of surgeon definitely does contribute to the total price of a cholecystectomy package, as seen in Table 9-9. Thoracic surgeons add \$67.70 more to the general surgeons' package price while those in other specialties (mostly GPs) cost \$209.28 less (see column 1 of Table 9-9). Part of this price differential reflects specialty differences in the type of operation performed and the other inputs used. Once we adjust for whether the common bile duct was explored, how many x-rays were performed, whether an assistant was used, etc., the specialty differences narrow considerably; the total package price of "other" surgeons is only \$79.46 lower than that of general surgeons (column 3). All of the other physician inputs add substantially to total price, as expected; every time the family physician visits the patient, for example, it adds \$15.32 to the bill.

Even more dramatic differences are found among the specialties treating cerebrovascular disease (Table 9-10). GPs who are osteopaths (DOs) and cardiologists treat these patients in much the same way as do general practitioner MDs. All other specialties, however, spend considerably more; general surgeons add \$111 to the total bill, and physical medicine (rehabilitation) specialists a staggering \$1,175. This, of course, is the total contribution of each specialty to the package price, including the effects each has because of the length of time they keep the patient in the

TABLE 9-9

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR CHOLECYSTECTOMY

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	1,034.67
Specialty of Surgeon <sup>a</sup> :				
Thoracic Surgeon	67.70**	61.76**	51.04***	0.08
Other Surgeon (not general)	-209.28***	-178.69***	-79.46***	0.03
Operation included <sup>b</sup> :				
Cholangiography	--	53.08***	32.11***	0.42
Exploration of Common Bile Duct	--	252.00***	164.72***	0.21
Exploration of CBD Plus	--	448.28***	242.37***	0.03
Assistant Surgeon	--	--	146.76***	0.28
No. of Routine Hospital Visits	--	--	15.32***	5.47
No. of Concurrent Care Visits	--	--	14.38***	0.47
No. of Consults	--	--	72.97***	0.33
Patient in ICU	--	--	105.73***	0.07
No. of X-Rays	--	--	23.92***	3.46
No. of ECGs	--	--	10.60***	1.17
Patient had Second Operation	--	--	187.95***	0.19
CONSTANT	1,035.38***	946.43***	683.61***	--
R <sup>2</sup>	0.02	0.15	0.79	
(df)	(2,1157)	(5,1154)	(13,1146)	
F	10.78***	41.86***	340.60***	

<sup>a</sup>General Surgeons are in intercept.

<sup>b</sup>Basic cholecystectomy is in intercept.

\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE 9-10

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR CEREBROVASCULAR DISEASE

	Regressions				Means
	(1)	(2)	(3)	(4)	
Total Package Price	--	--	--	--	552.27
Patient Age is 70+	-83.58***	-89.99***	-66.38***	-17.15*	0.80
Patient is Female	-11.93	-26.65*	-6.21	0.07	0.57
Specialty of Attending Physician <sup>a</sup> :					
GP-DO	25.46	37.07	54.36**	29.34*	0.08
General Surgeon	111.23***	139.88***	112.45***	59.42***	0.05
Internist	130.13***	111.35***	104.30***	47.93***	0.48
Cardiologist	65.41	70.44	49.11	-16.69	0.03
Neurologist	418.19***	489.77***	204.10***	65.36***	0.04
Neurosurgeon	314.22***	351.14***	252.33***	53.32*	0.02
Physical Medicine	1174.63***	623.09***	-130.11**	67.74	0.01
Multi-Specialty Group	138.99***	165.58***	184.96***	-3.63	0.06
Other Specialist	167.23***	92.25*	48.52	35.55	0.02
No. of Visits by Attending Physician	--	25.30***	23.15***	16.89***	11.46
No. of Visits by Other Physicians:					
GPs	--	--	34.07***	16.86***	0.30
Internists and Medical Specialists	--	--	43.03***	25.89***	1.05
Neurologists	--	--	42.32***	24.16***	0.45
Neurosurgeons	--	--	83.89***	29.70***	0.11
Other Surgeons	--	--	50.73***	30.97***	0.23
Physical Medicine	--	--	25.28***	22.42***	0.31
Other Specialists	--	--	35.47***	20.39***	0.16
Patient Admitted Through ER	--	--	--	-11.69	0.15
Patient Had Surgery <sup>b</sup>	--	--	--	30.97***	0.14
Patient in ICU	--	--	--	158.74***	0.23
No. of Arteriograms and Related Procedures	--	--	--	82.84***	0.32
No. of Other X-Rays	--	--	--	27.50***	1.71
CAT Scan - Head	--	--	--	73.72***	0.18
Brain Scan	--	--	--	11.89	0.07
Cerebral Blood Flow Study	--	--	--	74.91***	0.20
No. of Other Nuclear Medicine Studies	--	--	--	78.59***	0.18
No. of Routine and Special ECGs	--	--	--	43.81***	1.36
No. of Special Studies (incl. EEGs)	--	--	--	68.75***	0.48
CONSTANT	505.04***	238.36***	150.34***	-14.82***	--
R <sup>2</sup>	0.08	0.35	0.56	0.81	
(df)	11,3739	12,3729	19,3722	30,3711	
F	28.30***	169.55***	247.63***	517.87***	

<sup>a</sup>GP-MDs are in intercept.

<sup>b</sup>Minor and diagnostic surgery only, e.g., catheter insertions.

\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: Michigan 1981 Medicare Part B Claims Data.

hospital, their propensity to bring in other specialties for concurrent care or consultation, the number and type of tests they order, etc. Once we adjust for these other inputs, the net impact of several specialties (including physical medicine) is zero, i.e., their gross contribution to total package price is due solely to the inputs they use and not to the fees they charge. Other specialties, however, exact a premium for their services, above and beyond the number of visits they provide or the other services they use. Internists, for example, add \$47.93 to the total price solely by virtue of their training.

Attending physicians are not the only ones visiting cerebrovascular patients. Every time another physician sees the patient, it costs anywhere from \$16.86 to \$30.97, depending on the physician's specialty. The greater the number of these visits and the more, varied, specialists are involved, the higher the total package price will obviously be. (Of course, multiple physicians may be involved in a case because the patient is more seriously ill. This can only be a partial explanation, however, as we are holding constant patient age and sex, and whether the patient was under intensive care during the hospital stay.)

Despite the importance of the attending physician's specialty, specialty alone explains only a small percent of the variation in total package charges. Table 9-11 summarizes the total impact of specialty (both direct and indirect effects) on price for six inpatient condition packages. (Those conditions not shown, such as TURPs, were treated by a single specialty.) The price variation accounted for by the surgeon's or attending physician's specialty ranged from less than one percent (lens extraction) to a little over seven percent (cerebrovascular disease). This implies that differential package reimbursement by specialty might not be much more equitable on average than an all-specialty payment.

Table 9-11 also presents those specialties which generate high, average, and low package costs for each condition. Although we only have a limited sample of conditions, it is clear that a specialty which produces a more expensive package for one condition may not do so for another condition. Thoracic surgeons, for example, are more expensive than general surgeons for cholecystectomy packages but no different for pacemaker insertions. Similarly, cardiologists produce higher cost pacemaker and pneumonia packages, but are about average when it comes to cardiac catheterization and cerebrovascular disease. In Chapter 10, we directly examine the equity implications of alternative methods of payment for the various specialties.

TABLE 9-11

## SPECIALTY EFFECTS ON TOTAL PACKAGE PRICES

	Type of Physician		
	High Cost	Average	Low Cost
	Percent of Variation Explained by Specialty Alone		
Lens Extraction	0.23%	MD Ophthalmologist	Other Specialist
Cholecystectomy	1.83	Thoracic Surgeon	Other Specialist
Pacemaker Insertion	4.45	Cardiologist	Other Specialist
Cardiac Catheterization	2.21	--	Internist Other Specialist
Pneumonia	1.86	Internist Cardiologist Pulmonary Disease Specialist Multi-Specialty Group	--
Cerebrovascular Disease	7.33	GP (MDs and DOs) General Surgeon Other Specialist	--
		GP-DO General Surgeon Internist Neurologist Neurosurgeon Physical Medicine Multi-Specialty Group Other Specialist	GP-MD Cardiologist

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.

## 9.5 Hospital and Physician DRGs

In the preceding sections, we've examined physician equivalents to 13 of the 467 hospital DRGs. How do these two compare? Do physician DRGs exhibit the same relationship with each other that hospital DRGs do? Or are hospital and physician inputs substitutes in the production of an inpatient stay? If so, we would expect to find no relationship, or even an inverse one, between the two sets of DRGs. Within a related group of DRGs, (e.g., the four cholecystectomy DRGs), on the other hand, we would expect the two to be more similar. A DRG with complicating conditions, for example, should be both more hospital- and more physician-intensive than one without.

Table 9-12 presents the Medicare weights for the hospital DRGs and their physician equivalents for the 13 DRGs under analysis. In order to directly compare the two sets of DRGs and to make comparisons across states, all of the weights were standardized by DRG #39 (lens procedures).

While lens procedures are by far the least costly hospital DRG (in fact most hospital DRGs shown here cost two to four times as much), they are the second most expensive physician DRG. Consider pneumonia with complicating conditions or patient age greater than 70 (DRG #89). The hospital uses 220 percent more resources in caring for the pneumonia patient than it does for the patient undergoing a lens procedure. From the physician's perspective, it involves only a fifth as much effort (20.5%) to care for the pneumonia case.

Within related groups of DRGs, however, the hospital and physician weights are quite similar. Older patients and patients with complicating conditions use up more hospital and more physician resources.

## 9.6 Summary and Conclusions

Physician DRGs were created for five inpatient conditions: cholecystectomy, TURPs, pneumonia, cerebrovascular disease, and lens extraction.\* Although average package prices varied across DRGs as expected (e.g., cases with complicating conditions cost more than those without), there remained almost as much variation within each DRG package as there was for all cases combined. This appeared to be largely due to the tremendous variation in the number and type of physician services involved during the hospital

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\*Inpatient condition packages were constructed for additional surgical procedures that did not exactly correspond to DRGs. Although we focus our conclusions here on physician DRGs, they also apply to all of the inpatient condition packages we studied.

TABLE 9-12

RELATIVE COST WEIGHTS: HOSPITAL VS. PHYSICIAN DRGs<sup>a</sup>

<u>Medicare DRGs</u>		<u>Hospital Wts.</u>	<u>MD Wts. So. Carolina</u>	<u>MD Wts. Michigan</u>
<u>No.</u>	<u>Description</u>			
14	Specific cerebrovascular disorders, except TIA	2.7000	--	0.3585
15	Transient ischemic attacks	1.3319	--	0.2963
16	Non-specific cerebrovascular disorders with C.C.	1.7150	--	0.4484
17	Non-specific cerebrovascular disorders without C.C.	1.6750	--	0.2643
39	Lens procedures	1.0000	1.0000	1.0000
89	Pneumonia with C.C.	2.2014	--	0.2046
90	Pneumonia without C.C.	1.9659	--	0.1491
195	Cholecystectomy with common duct exploration and C.C.	4.3293	1.1278	--
196	Cholecystectomy with common duct exploration and without C.C.	4.1106	0.9452	--
197	Cholecystectomy without common duct exploration and with C.C.	2.9677	0.8870	--
198	Cholecystectomy without common duct exploration and without C.C.	2.5453	0.7696	--
336	Transurethral resection of the prostate with C.C.	2.0118	0.8687	--
337	Transurethral resection of the prostate without C.C.	1.6948	0.8365	--

<sup>a</sup>All weights have been standardized by DRG #39, lens procedures.

Source: Hospital weights have been calculated based on the relative weights for Medicare prospective payment, published in the Federal Register, 9/1/83. The physician weights for the two states were calculated from 1981 Medicare Part B Claims Data.

stay. Take surgical DRGs like those for cholecystectomy, for example: Besides the surgeon and anesthesiologist, there may be an assistant surgeon, radiologist, pathologist, a variety of consulting specialists, as well as the patient's personal family physician providing routine hospital visits.

While surgical DRG packages displayed considerable price variation (C.V.s generally averaged 25-40 percent), they appeared remarkably homogeneous when compared with medical DRG packages (where C.V.s often exceeded 100%). This implies that physicians treating these patients would be either under- or over-paid in nearly every case. Of course if much of this variation in input mix and charges is due to the specialty of the package physician (the surgeon or attending), then specialty-specific payment rates might prove more equitable. In fact, however, the choice of specialty had little impact on total package charges, either directly through the fees they charged or indirectly through the other physician inputs they ordered.

These findings suggest that DRGs as currently defined may not fully capture differences in physician resource use. Comparison with the Medicare DRGs used for hospital reimbursement suggests that hospital and physician inputs may be substitutes, rather than complementary inputs, in the production of inpatient stays. Our data are limited to only a small number of DRGs (13 of 467), however, and more comprehensive research is needed to evaluate the feasibility of physician DRGs.



## 10.0 DISTRIBUTIONAL EFFECTS OF ALTERNATIVE PACKAGING APPROACHES

### 10.1 Introduction and Policy Questions

#### 10.1.1 Paying Physicians Based on Averages

Any kind of packaging approach involves some sort of averaging. A bundle of services are selected to constitute the package, and the total package is then priced according to some predetermined criterion (e.g., fee schedule, customary charge, etc.). The services included in the package represent the average resources, such as physician time and ancillary tests, used to provide a certain type of care or to treat a certain type of patient. It is assumed that some cases will require more resources and some cases will require less, but that on average the package price is a reasonable reimbursement for the services provided. This assumption may not be valid, however, if certain types of physicians are consistently over or under the mean holding casemix constant. Are serious inequities or inefficiencies introduced when we create packages based on an average bundle of services?

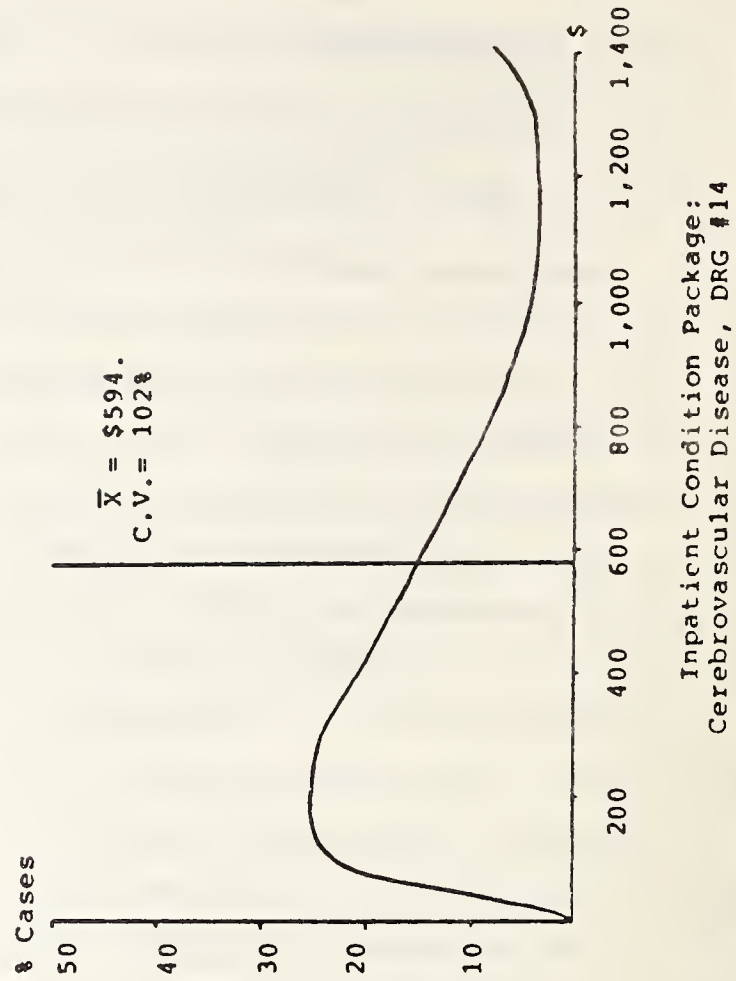
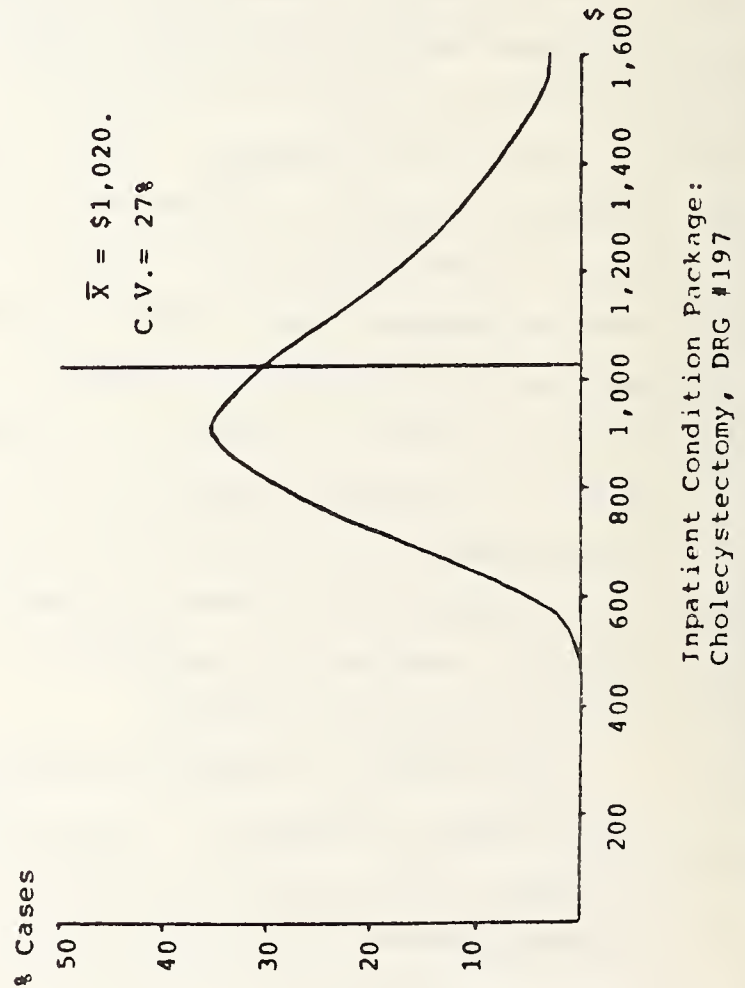
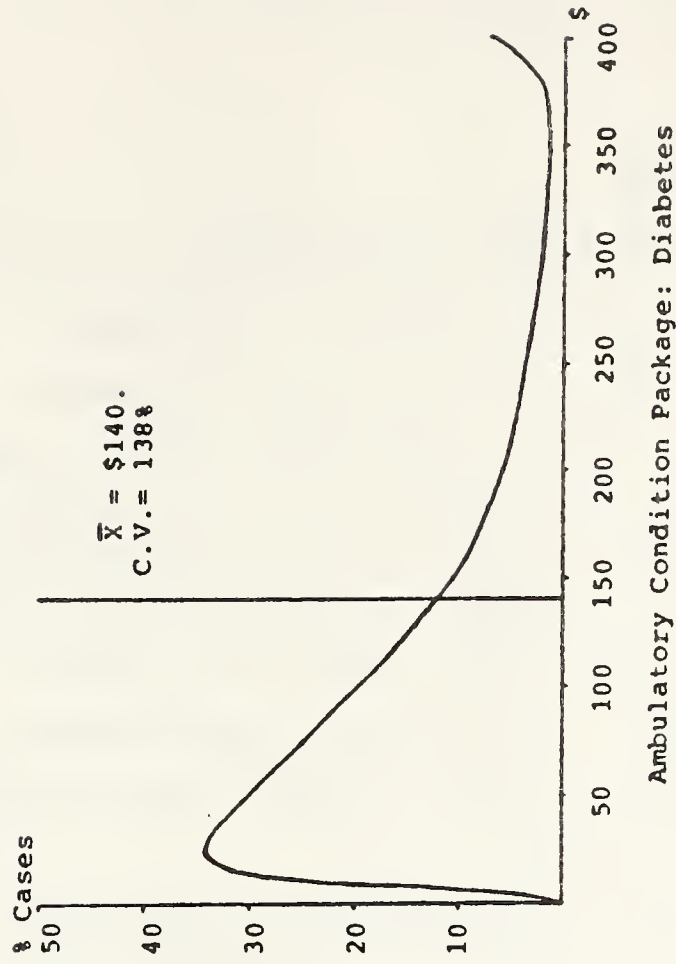
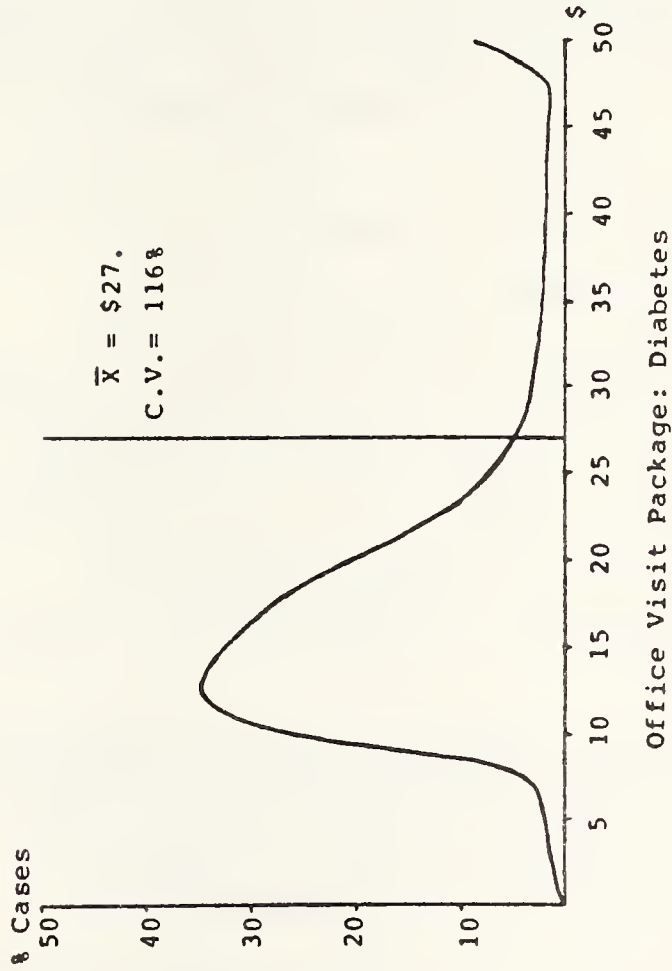
In the preceding chapters (6-9), we have found tremendous within-package variation, with C.V.s sometimes exceeding 100 percent. This suggests that physicians would end up being either significantly under or overpaid in nearly every case. Figure 10-1 displays the size distribution of total package costs for four of our packages: Office Visit, Ambulatory Condition, Surgical Inpatient Condition, and Medical Inpatient Condition.\* Each distribution shows a marked right skew, with the vast majority of cases often costing less than the package mean. Physicians managing these cases would derive potentially large windfall gains if reimbursed on average package costs. Physicians treating cases in the right-hand tail of the distribution, however, would lose and would lose big. If losses are due to excessive utilization, then packaging may encourage more efficient resource use. If, on the other hand, these cases are more seriously ill, then a package average could introduce substantial inequities -- particularly if casemix severity varied systematically by provider.

The greater the within-package variation, the more winners and losers we would expect to observe. Some random variation of course is to be expected. Of policy concern here is the degree of systematic variation by physician characteristics, such as specialty and willingness to accept assignment.

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\*The frequency distributions for cholecystectomy and cerebrovascular disease are based on DRGs 197 and 14, respectively. Collapsed packages are excluded, having been analyzed already in Chapter 5.

FIGURE 10-1. SIZE DISTRIBUTION OF TOTAL PACKAGE COSTS



### 10.1.2 How Should Specialists Be Treated?

An important issue in the reimbursement of packages is how to treat specialists, whether specialists should be paid differently from GPs and whether certain specialists should be paid differently from others. There are four major approaches policymakers might take:

- (1) make no distinctions in reimbursement;
- (2) set different reimbursement rates for specialists;
- (3) define the packages differently for specialists; or
- (4) proscribe some specialties from providing certain packages or exclude them in generating prices.

The first approach, to make no specialty distinctions in payment, has a certain intuitive appeal. If a GP can provide the same package of services as an internist, why pay the latter more? This approach should promote efficiency, by discouraging specialists from providing packages for which they are over-trained. Specialists presumably would gravitate towards the more complex (i.e., more expensive) packages. The potential problem here, of course, is that physicians may provide packages for which they are inadequately trained.

The current system operates now under the second approach, which generally reimburses specialists more. This is done either explicitly through a higher conversion factor (say, in a relative value scale), or implicitly by determining prevailing charges separately by specialty. This method would value packages differently depending on who is providing the services, rather than solely valuing the product. Some physicians argue that the service itself is qualitatively different when they do it. Internists, for example, maintain that their office visits involve a greater degree of "cognitive services" than those of other specialists and hence should be compensated more.

A third alternative is to define the content of the packages differently for different specialists. Thus, a three month hypertension package for a GP might be based on a less intensive bundle of services than one for internists, and priced accordingly less. The assumption here is that GPs would be treating more routine, less complex patients who would not need to be seen as frequently. (This is not in fact the case, at least in Michigan; there, GPs see their hypertension and diabetes patients as frequently and utilize ancillary services as intensively as internists do.) This approach would require perfect, or near perfect, triaging, to ensure that patients are seen

by the appropriate physician. Of course, GPs would have an incentive to refer complex cases to specialists because of the higher costs involved. The major problem comes on the other side, as specialists would want to retain easy cases but continue to receive the higher reimbursement for them.

Finally, some specialties could be proscribed altogether from certain packaging arrangements. Thus, GPs might be ineligible for any surgical or obstetric packages. This could improve overall quality of care, but could also restrict access to services in physician-shortage areas. Since GPs tend to cost less than specialists, this approach would also drive up total program expenditures, at least in the short run. A related approach would be to delete certain high cost specialties from the base when calculating average package costs. Thus, cholecystectomy charges for thoracic surgeons would not be used to determine package reimbursement on the grounds that they are over-trained and too expensive. Thoracic surgeons would be allowed to provide a cholecystectomy package; they just would not be paid any more than general surgeons.

In order to simplify the simulations presented later in this chapter, we limited our analysis to the first two reimbursement methods: physician-wide and specialty-specific payment. These are the methods currently used by Medicare to pay physicians, and thus have the weight of historical precedence in their favor. Unlike the latter two approaches, furthermore, they do not require policymakers to decide which are the appropriate specialties for each package.

### 10.1.3 Policy Questions

The purpose of this chapter is to simulate the distributional effects of packaging, that is, who the winners and losers would be under the alternative packaging approaches. Specifically:

- (1) How many cases are winners (actual cost less than package average), and how many are losers (actual cost greater than package average)?
- (2) How does the distribution of winning and losing cases vary by specialty and by type of package? Do we observe relatively fewer winners and losers when specialty-specific averages are used to calculate package payments rather than a physician-wide average?
- (3) What are the sources of loss? Do package physicians "lose money" on a case primarily because their fees are higher or because they use more inputs?

(4) How are winning and losing cases distributed across individual physicians? To what extent do they cancel each other out, leaving total physician resources unaffected?

(5) What implications does packaging have for access to Medicare services? Do losers account for a disproportionately large share of the total Medicare market, or of the assigned market?

## 10.2 Simulation Methodology

Using total package costs for each case and the package average, we can simulate the winners and losers under each approach. Let

$$(10.1) \quad \text{Diff}_{ij} = \text{TC}_{ij} / \bar{P}_j$$

$\text{Diff}_{ij}$  be the relative gain or loss on the  $i$ -th case in the  $j$ -th package,  $\text{TC}_{ij}$  = total package "costs", and  $\bar{P}_j$  = average package price (reimbursement). If  $\text{Diff}_{ij} > 1.1$ , i.e., total costs exceeded the reimbursement by 10 percent or more, the case was defined as a "loser". If  $\text{Diff}_{ij} < 0.9$  (total costs 10 percent lower than the average price), the case was considered a "winner". This arbitrary cut-off was used to standardize for the different dollar amounts associated with each package; ten percent was assumed to be the minimum amount necessary to produce true inequities and alter physician behavior. A five dollar increase or reduction in a package bill of \$500, for example, should have no impact on physicians, but a gain or loss of \$50 (or more) presumably would. Two values of  $\bar{P}_j$  were used in the analysis: a physician-wide average and specialty-specific means. For those packages based on multiple DRGs, all means were calculated by DRG as well.

Simulations based on the beneficiary or case may overstate the number of both winners and losers among physicians. From the individual physician's perspective, gains or losses on any one case may be less important than for the package as a whole. Do winning and losing cases cancel each other out, leaving the physician's total revenues unchanged? To examine this, we need to aggregate individual cases to the "package physician" level. Here, the  $k$ -th physician is defined as a winner or loser as follows:

$$(10.2) \quad \text{Diff}_{jk} = \sum_i \text{TC}_{ijk} / (N_{jk} * \bar{P}_j)$$

where  $N_{jk}$  = the number of cases in the  $j$ -th package treated by the  $k$ -th physician. Again, total revenues must exceed (fall short of) total

reimbursement by 10 percent for the physician to be considered a loser (winner).

Chapters 6-9 presented findings for 20 different procedures and diagnoses in four types of packages, or about 30 unique packages in all. For simplicity of presentation, we limited the simulation analysis to 13 distinct packages that were representative of all four packaging approaches:

(1) <u>Office Visit Packages</u>	Diabetes Hypertension
(2) <u>Special Procedure Packages</u>	Upper GI Endoscopy Proctosigmoidoscopy Inguinal Hernia Repair
(3) <u>Ambulatory Condition Packages</u>	Diabetes Hypertension
(4) <u>Inpatient Condition Packages</u>	Cholecystectomy DRGs Pacemaker Insertion Cerebrovascular DRGs Pneumonia DRGs TURP DRGs Lens Extraction

### 10.3 Distributional Effects: A Case-by-Case Analysis

#### 10.3.1 Impact of Package Type and Reimbursement Method

Table 10-1 compares the relative frequency of winning and losing cases under alternative packaging approaches and alternative reimbursement methods. Most striking are the large number of winning cases, cases costing the physician far less to treat than the amount of reimbursement received. Packages with the most winners are those with the greatest within-package variation. About two-thirds of ambulatory condition and medical inpatient condition packages, and three-fourths of office visit packages would bring the physician a profit. For these packages, the physician is either underpaid or overpaid on virtually every case, usually the latter. No package produces a majority of losers, however. At most, one-third of the cases, and usually only 20-25 percent, cost more to produce than the package would pay for.

The relatively large number of winners is consistent with the right-skewed distribution of package charges observed in Figure 10-1. With a package mean substantially higher than the mode, many (if not most) cases will fall below the average in total price. This distribution also implies, however, that the magnitude of the loss on above-average-cost cases is potentially enormous. We examine this directly in the following section (10.3.2).

TABLE 10-1

WINNERS AND LOSERS UNDER ALTERNATIVE PACKAGING APPROACHES<sup>a</sup>

Package Type	Reimbursement Method					
	Physician-Wide			Specialty-Specific		
	Winners	No Change	Losers	Winners	No Change	Losers
<u>Office Visit</u>						
Diabetes	75.4%	5.4%	19.2%	75.0%	6.3%	18.7%
Hypertension	79.3	3.5	17.2	79.2	3.2	17.6
<u>Special Procedure</u>						
Upper GI Endoscopy	32.3	39.8	27.9	26.9	41.1	32.0
Proctosigmoidoscopy	46.1	18.5	35.4	47.1	14.0	38.9
Hernia Repair	28.9	47.7	23.4	27.7	51.4	20.9
<u>Ambulatory Condition</u>						
Diabetes	67.4	6.5	26.1	67.5	6.0	26.5
Hypertension	67.8	5.3	26.9	67.7	5.5	26.8
<u>Inpatient Condition</u>						
Cholecystectomy DRG	41.9	31.9	26.2	41.5	32.6	25.9
Pacemaker Insertion	45.2	27.1	27.7	45.2	28.0	26.8
Cerebrovascular DRG	60.5	8.7	30.8	59.4	9.5	31.0
Pneumonia DRG	64.9	7.6	27.5	63.8	7.9	28.3

<sup>a</sup>Rows sum to 100% by package type and reimbursement method.

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.

Surprisingly, there are few differences in the distribution of winning and losing cases when payment is based on specialty-specific averages as opposed to a physician-wide mean. Table 10-1 presents data for a pooled sample of all physicians, but similar analysis (not shown) was conducted at the specialty level. For most specialties, specialty-specific payment rates had the expected impact on the size distribution of winners and losers, but the magnitude of the change was small (e.g., 2 or 3 percentage points). Specialty-specific rates yielded somewhat more losing, and fewer winning, cases for GPs, for example, with more winners and fewer losers for internists. The only dramatic improvements occurred for: (1) very highly trained physicians such as neurologists and pulmonary disease specialists; and (2) those specialties who infrequently provide the package (and may be over-trained for it), such as thoracic surgeons performing hernia repairs.

In the analyses that follow, we define winners and losers based on specialty-specific reimbursement method. This gives us a more conservative estimate of the impact that packaging would have on physician practice patterns. Specialty-specific rates may also adjust for residual casemix differences not captured in our packages.

### 10.3.2 Sources of Loss under Packaging

Physicians may lose money on a given case, either because they charge higher fees or because they use more (or more expensive) inputs. Table 10-2 compares average total charges between winners and losers for five specific packages. Because these charges are averaged across all cases, they reflect both the probability that the physician service was performed as well as the number of services actually provided. On a diabetes office visit package, for example, a losing case cost \$70.31 (in physician charges) and a winning case only \$16.09. Less than \$4 of this difference ( $\$18.07 - \$14.62 = \$3.45$ ) was attributable to higher office visit fees. Most of the loss was due to lab test intensity which accounted for \$40 of the \$54 difference in cost, or 80 percent. Similarly, one-third of the \$298 difference in the diabetic ambulatory condition price was due to lab test intensity, and only 8 percent (\$25) to more expensive (or more frequent) visits to the package physician.

By contrast, most of the losing upper GI endoscopy cases are unprofitable because of the high fees charged by the surgeon performing the procedure (\$57 of the \$81 difference in total package costs). Surprisingly, higher surgeons' fees account for only a small part of the loss on cholecystectomy DRG packages



TABLE 10-2

SOURCES OF LOSS ON ALTERNATIVE PACKAGING APPROACHES<sup>a</sup>

	Average Total Charges	
	Winners	Losers
<u>Office Visit Package:</u>		
<u>Diabetes</u>		
Office Visit	\$14.62	\$18.07
X-rays	0.05	4.46
ECGs	0.00	5.84
Injections	0.19	0.80
Lab Tests	1.25	41.25
Total Package Price	\$16.09	\$70.31
-----		
<u>Special Procedure Package:</u>		
<u>Upper GI Endoscopy</u>		
Surgeon	\$153.54	\$210.60
Same Day Visit	2.85	9.02
X-rays	2.97	20.46
Total Package Price	\$159.30	\$240.05
-----		
<u>Ambulatory Condition Package:</u>		
<u>Diabetes</u>		
Office Visits - Package Physician	\$30.95	\$55.85
Office Visits - Other Physicians	5.15	18.84
X-rays	3.11	44.28
ECGs	1.97	32.49
Injections	0.54	6.44
Office Surgery	2.68	54.75
Lab Tests	10.06	108.77
Other Tests	0.66	29.81
Total Package Price	\$55.96	\$354.15
-----		
<u>Inpatient Condition Package:</u>		
<u>Cholecystectomy DRGs</u>		
Surgeon	\$584.39	\$643.39
Assistant Surgeon	22.64	45.03
Anesthesiologist	130.76	173.96
Other Surgery	4.58	99.09
Visits and Consultations	34.12	271.03
X-rays	34.96	123.02
ECGs	6.59	11.58
Total Package Price	\$819.36	\$1,389.74
-----		
<u>Inpatient Condition Package:</u>		
<u>Cerebrovascular DRGs</u>		
Visits and Consultations	\$188.10	\$668.06
Minor Surgery	9.43	151.26
Diagnostic X-rays	14.75	107.48
Nuclear Medicine Tests	19.67	99.21
ECGs	13.61	53.17
Other Tests	8.49	42.91
Total Package Price	\$253.36	\$1,121.42

<sup>a</sup>Winners and losers are defined based on specialty-specific (as opposed to physician-wide) reimbursement method. Dollar values represent Medicare reasonable charges.

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.

(10% or \$59 of the \$570 difference). Losses are primarily due to nonsurgical visits and consultations which account for almost one-half of the difference in package costs between winners and losers.

Although virtually every input is utilized more intensively in losing cerebrovascular DRG packages, the lion's share of the loss is attributable again to visits and consultations (55%, or \$480 of the \$868 gap). Since hospital visits are largely a function of length of stay, losing cases should be sicker. If so, severity-of-illness differences have not been adequately captured by the DRG-specific (and specialty-specific) rates--at least for physicians' services. (Length of stay was the primary discriminating variable used to construct the DRGs.)

### 10.3.3 Do Assigned Cases Win or Lose?

The proportion of assigned cases that are winners and losers may not mirror that of Medicare cases generally. If package physicians accepting assignment charge lower fees but utilize more inputs, then their cases may be more unprofitable than predicted by their fees alone. What happens to assigned cases could also have important implications for access to care by assigned beneficiaries. The primary policy concern is with assigned cases that would be losers under packaging. If physicians lose money disproportionately on their assigned cases, then they may refuse assignment in the future. Those patients would then have to make up the difference between the physician's charge and the average package price (which can be considerable, as we have seen) or try and find another physician willing to accept their "package" on assignment. Even apparent winners (assigned beneficiaries whose package costs are less than average) may be worse off, however. A diabetes ambulatory condition package based on our claims data would pay physicians an average of \$140 every three months, but winning cases cost only \$56. These beneficiaries would be liable for an additional \$17 out of pocket, as the 20 percent copayment would now be exacted on the higher package reimbursement amount ( $0.2 * \$140 - 0.2 * \$56 = \$16.80$ ).

Table 10-3 presents the distribution of assigned winners and losers for the same package types shown earlier in Table 10-1. Because assignment rates vary systematically by package (and hence, assigned cases represent varying proportions of all package cases), we include the percent of cases taken on assignment in the first column of Table 10-3. Assigned cases are defined based on whether the package physician accepted assignment. For the most

TABLE 10-3

SIZE DISTRIBUTION OF ASSIGNED WINNERS AND LOSERS<sup>a</sup>

Package Type	Percent of All Cases Assigned	Percent Distribution of Assigned Cases <sup>b</sup>		
		Winners	No Change	Losers
<u>Office Visit</u>				
Diabetes	50.7%	74.6%	5.9%	19.5%
Hypertension	50.3	79.3	3.4	17.3
<u>Special Procedure</u>				
Upper GI Endoscopy	68.6	31.7	41.3	27.0
Proctosigmoidoscopy	26.3	56.4	10.8	32.8
Hernia Repair	59.5	18.2	50.2	31.6
<u>Ambulatory Condition</u>				
Diabetes	43.9	64.8	6.4	28.8
Hypertension	45.2	64.3	5.0	30.7
<u>Inpatient Condition</u>				
Cholecystectomy DRG	67.0	43.5	33.3	23.2
Pacemaker Insertion	69.2	46.6	27.2	26.3
Cerebrovascular DRG	83.2	57.8	9.2	33.0
Pneumonia DRG	84.8	63.2	7.6	29.2

<sup>a</sup>Assigned cases are based on whether the package physician (surgeon, attending, etc.) accepts assignment.

<sup>b</sup>Rows sum to 100 percent.

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.

part, assigned cases are distributed across the winner, loser, and no change groups very much like all Medicare cases (recall Table 10-1). Special procedure packages are a notable exception. Upper GI endoscopy and proctosigmoidoscopy packages accepted on assignment are more likely to be winners (and less likely to be losers) compared with packages for those procedures generally. The opposite is true for the hernia repair package, with a disproportionate share of assigned cases in the loser group (32% of assigned hernia repairs would be losers vs. 21% of all such packages).

Table 10-3 suggests that, for the most part, packaging would not have a disproportionate impact on beneficiaries whose physicians currently accept assignment. Care must be taken in generalizing from these descriptive findings, however, as neither of our states are representative of U.S. physicians. Both Michigan and South Carolina have assignment rates well above the national average, and Michigan has one of the highest in the country.

#### 10.4 Distributional Effects on Physicians

##### 10.4.1 The Importance of Physician Caseloads

In the preceding section, our analysis focused on the distribution of winning and losing cases. Any one physician, however, would probably treat both winning and losing cases, so the ultimate policy question centers on how the physician fares overall. To what extent do the high and low cost cases cancel each other out within a given package, leaving the physician's total revenues unchanged? Of course, some physicians will consistently produce packaged care at above or below average costs, either because of differences in casemix or practice (in)efficiency, but we would expect the majority of physicians to be quite variable in their treatment mode due to random severity patterns. For gains and losses to cancel each other out, physicians must have a large enough sample of cases to start within any period.

Our original plan was to construct physician-level files for all of our DRG inpatient condition packages: cholecystectomy, TURP, cerebrovascular disease, pneumonia, and lens procedures. Each of these represented the universe of all Medicare admissions for that condition in Michigan and South Carolina for an entire year. As seen in Table 10-4, however, average physician caseloads were extremely low in three of the five packages.

TABLE 10-4

AVERAGE ANNUAL CASELOADS FOR PHYSICIAN DRGs

<u>Inpatient Condition (DPG)</u>	<u>Cases Per Physician</u>
Cholecystectomy	4.6
TURP	20.6
Cerebrovascular Disease	2.2
Pneumonia	2.7
Lens Procedures (Michigan)	25.6
Lens Procedures (South Carolina)	25.3

Low caseloads are partially attributable to the fact that Medicare does not dominate the market for that condition. The majority of hospital admissions for cholecystectomy and pneumonia are for persons less than 65 years of age (NCHS, 1982, 1983), while lens extractions and TURPs are performed primarily on the elderly. This does not explain low physician caseloads for cerebrovascular disease, however, where the elderly account for three-fourths of hospitalizations. An alternative explanation is the diversity of specialties caring for cerebrovascular disease patients depending on reason for admission, e.g., treatment of acute episode (stroke), neurological evaluation, physical rehabilitation, etc.

Whatever the reason, these small caseloads have important implications for the whole concept of packaging. What they suggest is that simple actuarial principles may not work for many conditions, nor for many physicians; who wins and who loses may be largely a random event, with inequitable losses and windfall gains. Of course, the averaging principle can work across packages as well as within. We would really need to look across all conditions treated by a physician to determine whether a few high cost pneumonia packages, for example, would be offset by a large number of low cost hypertension packages. Unfortunately, we would need the universe of all Medicare claims to do so. Thus, the ultimate analysis of winners and losers must await future study. Nonetheless, we can compare the distribution of winners and losers across individual physicians for two DRG condition packages: lens extractions and TURPs.

#### 10.4.2 Winning and Losing Physicians

Analysis based on individual cases would appear to overestimate the number of losing physicians, as seen in Table 10-5. There are many fewer losing lens extraction physicians than cases, as high and low cost cases are in fact cancelling each other out for many physicians. Not only are there fewer losers, but over one-half of Michigan ophthalmologists would gain overall on lens extraction packages compared to only 37 percent of cases.

By contrast, averaging across TURP packages leaves the majority of South Carolina urologists unaffected, with a very small number of winning physicians relative to the number of winning cases. Most physicians apparently have a similar mix of many inexpensive cases offset by a few very expensive ones.

Somewhat surprisingly, winning physicians have much smaller caseloads than do other physicians providing the package (see Table 10-6, line 1). Winning ophthalmologists perform only half as many lens extractions as do their colleagues. Larger caseloads for losing ophthalmologists means their annual losses are that much greater. Losing ophthalmologists in Michigan, for example, would lose \$411 on every lens extraction package they provided, for a total loss of almost \$14,000 over the course of the year.

For the most part, it appears that losing physicians lose money on most of the cases they treat within a package (53-83%) while winning physicians make a profit on most of their cases (80-90%). Thus, it is not one or two extraordinarily expensive cases that puts a physician in the red for the year, but rather a systematic pattern of more intensive treatment. It is possible of course that losers are treating more seriously ill cases, but we have no evidence to prove that.\*

Table 10-7 identifies the sources of loss for physicians by comparing average per case expenditures. Ophthalmologists are losing money on lens extraction packages not because of the consults or ancillaries they order, but because of the fees they charge. High surgeons' fees account for 85 percent and 68 percent of the difference in total package price between winners and losers in South Carolina and Michigan, respectively. (Most of the remaining deficit in Michigan is due to the greater use of assistant surgeons.)

---

\*If anything, the reverse could be true. Losing urologists operated on disproportionately fewer patients with complicating conditions (DRG #336). Only 16 percent of their cases were in the "more serious" DRG, versus 27 percent and 38 percent of cases for no change and winners, respectively.

TABLE 10-5

COMPARISONS OF WINNERS AND LOSERS: SURGICAL CASES VS. INDIVIDUAL PHYSICIANS<sup>a</sup>

	Winners	No Change	Losers
<u>Lens Extraction, Michigan</u>			
Cases	37.1%	28.8%	34.1%
Physicians	51.5	23.0	25.5
<u>Lens Extraction, South Carolina</u>			
Cases	41.4	11.8	46.8
Physicians	42.1	33.6	24.3
<u>TURPs, South Carolina</u>			
Cases	41.3	35.4	23.3
Physicians	19.2	59.6	21.2

<sup>a</sup>Rows sum to 100 percent.

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.

TABLE 10-6

CASELOADS, COSTS, AND SIZE OF GAIN (LOSS) FOR PHYSICIANS PERFORMING LENS EXTRACTIONS AND TURPS

	Lens Extractions						TURPS		
	Michigan Physicians			South Carolina Physicians			South Carolina Physicians		
	Winners (51.5%)	No Change (23.0%)	Losers (25.5%)	Winners (42.1%)	No Change (23.6%)	Losers (24.3%)	Winners (19.2)	No Change (59.6%)	Losers (21.2%)
Operations/Physician	17.8	34.5	33.5	18.2	33.2	40.7	19.1%	23.6	13.6
Average Gain (Loss) per Operation	\$ 400	\$ 9	\$ (411)	\$ 283	\$ (26)	\$ (197)	\$ 126	\$ (22)	\$ (155)
Total Gain (Loss)	\$ 7,101	\$ 322	\$ (13,785)	\$ 5,143	\$ (863)	\$ (8,024)	\$ 2,403	\$ (517)	\$ (2,107)
Percent of Cases Lost	5%	24%	83%	4%	46%	77%	3%	24%	53%
Percent of Cases Won	80%	26%	9%	90%	38%	16%	81%	34%	21%
Percent of Costs Paid by Package	154%	100%	78%	137%	99%	85%	188%	98%	84%

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.



TABLE 10-7

SOURCES OF LOSS FOR PHYSICIANS UNDER PACKAGING

	<u>Average Per Case Charges</u>	
	<u>Winners</u>	<u>Losers</u>
<u>Lens Extraction, Michigan</u>		
Surgeon	\$986.84	\$1,536.94
Assistant Surgeon	17.38	198.32
Anesthesiologist	169.63	171.32
Other Surgery	48.47	111.29
Visits and Consultations	19.79	35.22
X-Rays	4.15	5.47
ECGs	6.93	6.56
Total Package Price	\$1,257.33	\$2,068.86
<u>Lens Extractions, South Carolina</u>		
Surgeon	\$701.88	\$1110.63
Assistant Surgeon	0.00	12.61
Anesthesiologist	124.42	169.54
Other Surgery	18.50	21.41
Visits and Consultations	11.38	10.61
X-Rays	5.15	10.41
ECGs	4.41	6.00
Total Package Price	\$867.37	\$1,347.36
<u>TURPs, South Carolina</u>		
Surgeon	\$677.46	\$690.17
Assistant Surgeon	0.51	0.44
Anesthesiologist	77.65	121.01
Other Surgery	23.78	106.16
Visits and Consultations	36.32	130.08
X-Ray	25.45	53.45
ECGs	7.19	11.28
Total Package Price	\$849.73	\$1,124.47

<sup>a</sup>Dollar values represent Medicare reasonable charges.

Source: Michigan and South Carolina 1981 Medicare Part B Claims Data.

In sharp contrast, there is virtually no difference in the fees charged by winning and losing urologists for performing a TURP. About one-third of the difference in price is due to more visits and consultations to losing cases, one-third to other surgery (usually performed by the same urologist), and the remaining third is due to more x-rays and higher fees paid to the anesthesiologist. Unlike their ophthalmologist colleagues who could simply forego their high fees in order to break even on lens packages, losing urologists would have to alter their behavior more drastically. In order to come out ahead on TURP packages, they would need to make fewer referrals to other physicians, order fewer tests, and refrain from performing other surgical procedures during the TURP admission.

#### 10.4.3 Medicare Market Shares of Winners and Losers

Even more important than the number of winners and losers are the Medicare market shares represented by those physicians. If losing physicians provide a relatively small proportion of all procedures in a given package, and have low assignment rates, then packaging would have little adverse effect on beneficiary access to care. Table 10-8 presents the distribution of all lens extraction and TURP packages, and the distribution of all those accepted on assignment, across physicians. (Since our data base includes all Medicare procedures done in South Carolina and Michigan, we can truly consider these market shares.) Although losing ophthalmologists accounted for only one-fourth of all ophthalmologists, they perform one-third of all lens extractions in both states. In Michigan, furthermore, losing ophthalmologists also are responsible for a disproportionate share of the assigned operations (42.3%). If these physicians were to drop out of the Medicare market, it could seriously jeopardize access to vision care, especially for the poorer elderly. Presumably, however, winning ophthalmologists would expand their small caseloads to fill the gap. Since the package price is high relative to their package costs, furthermore, we would also expect them to be more willing to accept assignment. Only a prospective demonstration project would enable us to determine the net impact on beneficiary access to Medicare services.

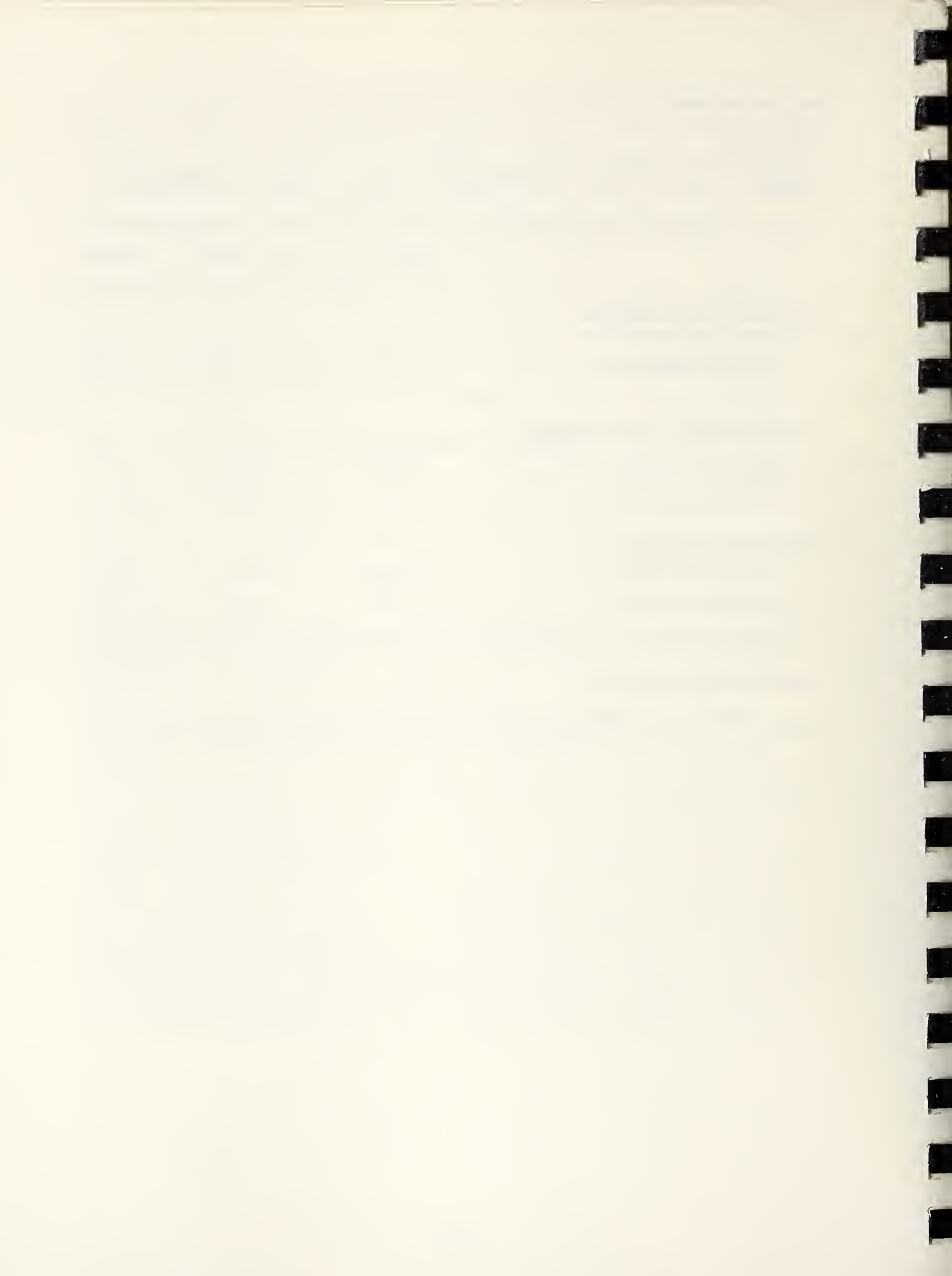
TABLE 10-8

DISTRIBUTION OF TOTAL AND ASSIGNED MEDICARE MARKET SHARES FOR WINNERS AND LOSERS<sup>a</sup>

	Winners	No Change	Losers
<u>Lens Extraction, Michigan</u>			
Total Operations	35.8%	30.9%	33.3%
Assigned Operations	23.8	33.9	42.3
<u>Lens Extraction, South Carolina</u>			
Total Operations	26.7	38.9	34.4
Assigned Operations	26.2	43.2	30.6
<u>TURPs, South Carolina</u>			
Total Operations	14.0	68.2	17.8
Assigned Operations	12.7	69.9	17.4

<sup>a</sup>Rows sum to 100 percent.

Source: Michigan and South Carolina Medicare 1981 Part B Claims Data.



APPENDIX A: CONSTRUCTION OF INTENSITY INDEX



The following describes the methodology used to develop the intensity indices which appear in the analyses of office visits in Chapters 5 and 6 of this report. An intensity index is included in the analyses in order to make comparisons of resources used during office visits stratified by (1) CPT-4 visit categories in Chapter 5 and (2) alternative casemix measures in Chapter 6.

There are several methodologic issues which arise in the process of constructing such an index. First, how should physician time be valued relative to ancillary use? Is five extra minutes of physician time worth one lab test, for instance? Another issue concerns the valuation of ancillary services relative to one another (e.g., is an ECG worth twice as much as an x-ray?) We have adopted the use of their relative prices as a common, albeit imperfect, measure of their relative value. A final methodologic issue concerns the assessment of the value of the time of different physician specialties. Because of data limitations, we have valued all physician time equally. Any specialty variation noted in the index can therefore be interpreted as reflecting "pure" differences in practice style and/or ancillary utilization between the specialties.

The two indices, while similar in objectives, represent the measurement of two slightly different dimensions of physician resources used. The index used in Chapter 5 to analyze the differences across CPT-4 visit categories reflects only the value of the procedures performed and ordered during each office visit. The length of visit was not included in this index.

This index takes the following form:

$$I_i = \frac{\sum_{j=1}^n \bar{P}_j * F_{ji}}{\sum_{j=1}^n \bar{P}_j * \bar{F}_j}$$

where:

$I_i$  = value of the intensity index for the i-th office visit;

$\bar{P}_j$  = the mean price of the j-th ancillary;

$F_{ji}$  = the frequency of the j-th procedure in the i-th office visit;

$\bar{F}_j$  = the average frequency of the j-th procedure for all visits.

The construction of the intensity index in Chapter 6 is similar to the one described above with two exceptions. First, it includes only an indication of the types of medical procedures involved in an office visit without their frequency. Second, the index includes length of visit as another dimension of physician input. The index is expressed algebraically as the following:

$$I_i = \frac{(\bar{PM} * L_i) + \sum_{j=1}^n \bar{P}_j * F_{ji}}{(\bar{PM} * \bar{L}) + \sum_{j=1}^n \bar{P}_j * \bar{F}_j}$$

where:

$I_i$  = value of the intensity for i-th office visit;

$\bar{PM}$  = mean price per minute of physician time;

$L_i$  = length of the i-th office visit;

$\bar{L}$  = average length of visit in the sample;

$\bar{P}_j$  = mean price of j-th ancillary;

$F_{ji}$  = occurrence of the j-th procedure in the i-th office visit;  
( $F_{ji}$  can only equal 0 or 1 for any individual procedure);

$\bar{F}_j$  = average occurrence of the j-th procedure for all visits.

The denominator in both indices represents the average value of that index for all physicians in the United States. The index thus varies around the value one, with one representing the average intensity of an office visit provided by the average physician in the U.S.

The prices for the ancillary services included in both of the indices come from unpublished, National Medicare prevailing charge data.\* For a number of ancillaries, charge data were available for more than one procedure (e.g., there were charges for six different x-rays and 14 different lab tests.) For these categories of service, price represents a weighted average of charges. (Weights are based on the frequency of Medicare claims used to construct the prevailing in each charge locality, a reasonable proxy for total services provided.)

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\*These charge data were provided to the project by the Office of Program Administration, HCFA. The index used in Chapter 5 are 1979 data and the index in Chapter 6 used 1981 data.



The price of physician time ( $\overline{PM}$ ) for use in Chapter 6 is also imputed from available prevailing charge data. First, an average office visit charge was determined by taking a weighted average of Medicare prevailings for ten different types of office visits. This fee was then divided by the average length of visit from the NAMC surveys, yielding an average physician charge per minute. Table A-1 presents each component of the indices along with its price.

TABLE A-1

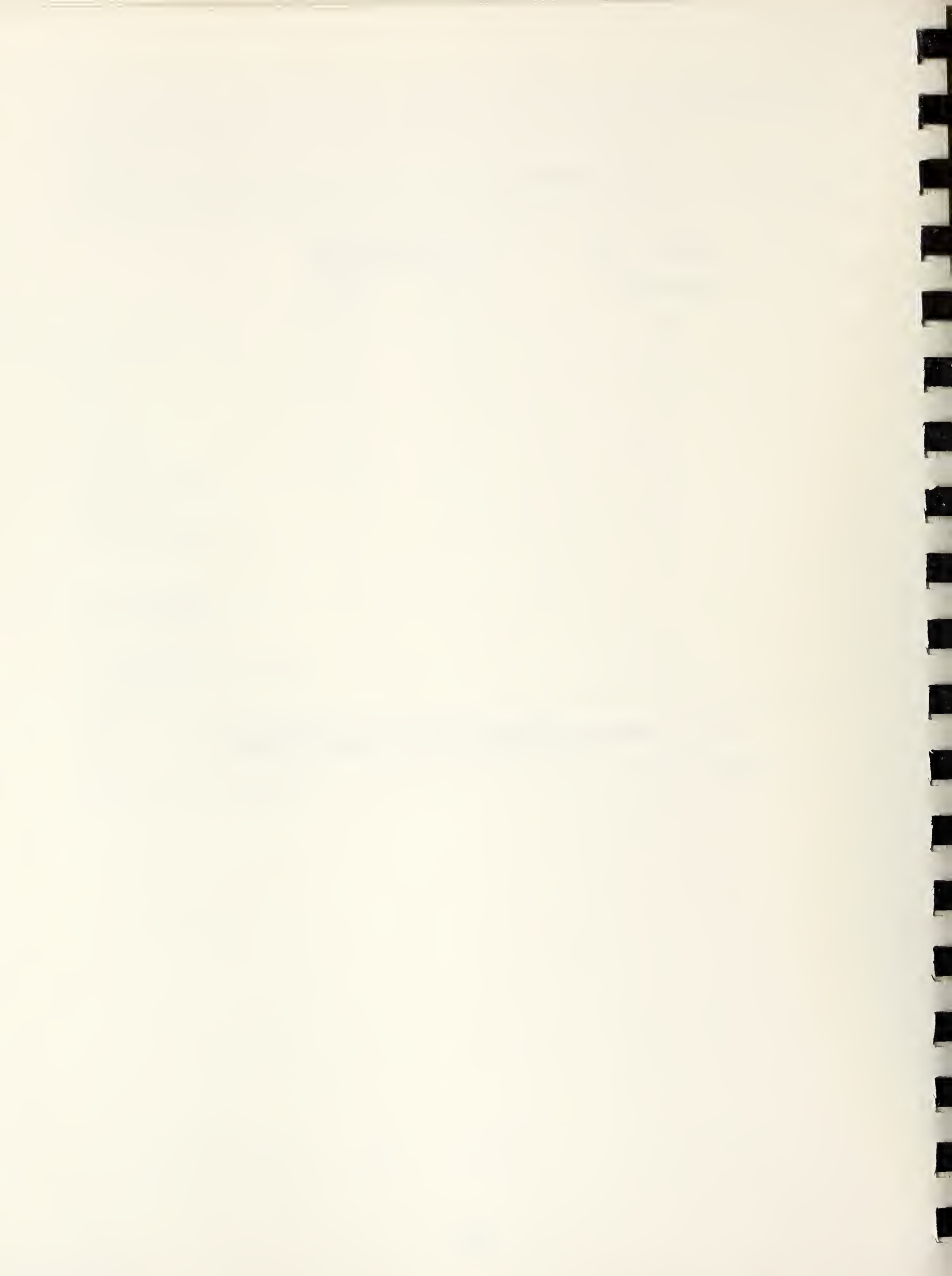
## COMPONENTS OF THE INTENSITY INDICES AND THEIR RELATIVE PRICES

	<u>National Medicare Prevailing Charges</u>		<u>U.S. Average Visit Intensity</u>
	<u>1978<sup>a</sup></u>	<u>1981<sup>b</sup></u>	<u>(1979-1980)</u>
Endoscopy	\$44.03	\$59.19	1.18
X-ray	28.66	26.57	7.8
ECG	21.76	28.26	2.8
Pap test	8.98	7.17	4.7
Lab test	5.60	6.09	22.5
Office surgery	17.81	23.43	7.4
Vision test	--	26.16	5.8
Physiotherapy	--	19.01	4.1
Physician Time (\$ per minute)	--	1.28	--
Average Length of Visit (in minutes)			15.1

<sup>a</sup>These are the components of the index used in Chapter 5 (USC sample).

<sup>b</sup>These are the components of the index used in Chapter 6 (NAMCS sample).

APPENDIX B: DETAILED TABLES FOR CHAPTERS 5-9



## COLLAPSED PROCEDURE PACKAGE: DIAGNOSTIC CYSTOURETHROSCOPY

CPT-4 Code	Procedure	Frequency (n = 1,099)	Usual Charge	Medicare Reasonable
52000	Cystourethroscopy (separate procedure), office;	0.32	\$68	\$55
52005	with ureteral catheterization with or without irrigation, instillation or ureteropyelography, exclusive of radiologic service	a	103	103
52007	with ureteral catheterization and brush biopsy of ureter or renal pelvis for cytology	0.00	--	--
52010	with ejaculatory duct catheterization	0.00	--	--
-----				
Collapsed <u>Office</u> Procedure Package Price		0.32	\$68	\$55
Coefficient of Variation			34.8%	28.7%
-----				
52100	Cystourethroscopy, hospital;	0.49	\$114	\$91
52105	with ureteral catheterization, with or without irrigation, instillation, or ureteropyelography, exclusive of radiologic service	0.18	173	138
52107	with ureteral catheterization and brush biopsy of ureter or renal pelvis for cytology	0.01	179	157
52110	with ejaculatory duct catheterization	0.00	--	--
-----				
Collapsed <u>Hospital</u> Procedure Package Price		0.68	\$130	\$104
Coefficient of Variation			32.6%	27.8%
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$110	\$88
Coefficient of Variation			43.0%	38.5%

<sup>a</sup>Frequency less 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 5-2

## COLLAPSED PROCEDURE PACKAGE: DIAGNOSTIC PROCTOSIGMOIDOSCOPY

CPT-4 Code	Procedure	Frequency (n = 1,581)	Usual Charge	Medicare Reasonable
45300	Proctosigmoidoscopy; diagnostic (separate procedure)	0.95	\$32.56	\$25.24
45302	with collection of specimen by brushing or washing for cytology	a	26.67	24.96
45303	with dilation, direct, instrumental	0.01	47.14	27.16
45305	with biopsy	0.02	59.18	46.04
45307	with removal of foreign body	0.00	--	--
45310	with removal of polyp or papilloma	0.01	84.44	64.48
45315	with removal of multiple excrescences, papillomata or polyps	a	150.00	125.00
45317	for control of hemorrhage	a	87.50	50.00
45319	with retrograde lavage (e.g., water pik)	a	137.50	34.95
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$34.18	\$26.31
Coefficient of Variation			44.8%	35.2%

<sup>a</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 5-3

COLLAPSED PROCEDURE PACKAGE: DIAGNOSTIC SIGMOIDOSCOPY

CPT-4 Code	Procedure	Frequency (n = 549)	Usual Charge	Medicare Reasonable
45330	Sigmoidoscopy, flexible fiberoptic; diagnostic	0.93	\$62.67	\$51.06
45331	with biopsy	0.06	93.55	83.17
45332	with removal of foreign body	a	75.00	75.00
45333	with removal of polyp(s)	0.01	139.75	98.94
45334	for control of hemorrhage	0.00	--	--
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$65.56	\$53.61
Coefficient of Variation			47.0%	45.5%

<sup>a</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Claims Data.

TABLE B 5-4

COLLAPSED PROCEDURE PACKAGE: DIAGNOSTIC UPPER GI ENDOSCOPY

CPT-4 Code	Procedure	Frequency (n = 762)	Usual Charge	Medicare Reasonable
43235	Upper gastrointestinal endoscopy including esophagus, stomach, and either the duodenum and/or jejunum as appropriate; diagnostic	0.60	\$215.99	\$175.82
43239	with biopsy and/or collection of specimen by brushing or washing for cytology	0.35	231.56	202.43
43247	with removal of foreign body	a	234.00	214.26
43251	with removal of polyp(s)	a	314.33	211.51
43255	for control of hemorrhage	a	212.50	179.67
43258	with fulguration of mucosal lesion	0.00	--	--
43260	with cannulation of ampulla of Vater for radiographic studies and/or specimen collection for cytology	0.04	342.78	243.19
43262	with sphincterotomy (Oddi) and/or papillotomy	a	215.00	215.00
43263	with pressure measurement of sphincter of Oddi	0.00	--	--
43264	with extraction of stone from common bile duct	0.00	--	--
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE			\$247.17	\$203.94
Coefficient of Variation			26.7%	21.0%

<sup>a</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.



TABLE B 5-5

## COLLAPSED PROCEDURE PACKAGE: LENS EXTRACTION

CPT-4 Code	Procedure	Frequency (n = 3,083)	Usual Charge	Medicare Reasonable
66840	Removal of lens material; aspiration technique, one or more stages	a	\$610	\$485
66850	phacofragmentation technique (mechanical or ultrasonic, e.g., phacoemulsification), with aspiration	0.01	889	710
66920	Extraction lens with or without iridectomy; intracapsular, with or without enzymes	0.31	863	663
66930	intracapsular, for dislocated lens	0.01	817	674
66940	extracapsular (other than 66840, 66850, 66915)	0.07	888	683
66980	Insertion intraocular lens prosthesis; with cataract extraction (any technique) one stage	0.57	1,282	1,149
66985	secondary, subsequent to cataract extraction	0.02	869	758
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE		1.00	\$1,102	\$943
Coefficient of Variation			22.4%	27.0%

<sup>a</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 5-6

## COLLAPSED PROCEDURE PACKAGE: LEFT HEART CATHETERIZATION

CPT-4 Code	Procedure	Frequency (n = 522)	Usual Charge	Medicare Reasonable
93510	Left heart catheterization, retrograde, from the brachial artery, axillary artery or femoral artery; percutaneous	a	\$473	\$180
93511	by cutdown	a	250	200
93514	by left ventricular puncture	0.00	--	--
93515	by transseptal venous catheterization	a	700	219
93524	Combined transseptal and retrograde left heart catheterization	0.00	--	--
93526	Combined right heart catheterization and retrograde left heart catheterization	0.02	438	298
93527	Combined right heart catheterization and transseptal left heart catheterization (with or without retrograde left heart catheterization)	0.00	--	--
93528	Combined right heart catheterization with left ventricular puncture (with or without retrograde left heart catheterization)	0.00	--	--
93546	Combined left heart catheterization and left ventricular angiography	0.01	257	191
93547	Combined left heart catheterization, selective coronary angiography and selective left ventricular angiography	0.59	602	470
93548	Combined left heart catheterization, selective coronary angiography, selective left ventriculography, and aortic root aortography	0.03	695	390
93549	Combined right and left heart catheterization, selective coronary angiography, and selective left ventricular angiography	0.34	700	592
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$630	\$500
Coefficient of Variation			22.3%	24.7%

<sup>a</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 5-7

COLLAPSED PROCEDURE PACKAGE: INGUINAL HERNIA REPAIR

CPT-4 Code	Procedure	Frequency (n = 807)	Usual Charge	Medicare Reasonable
49505	Unilateral inguinal hernia repair	0.85	\$442	\$361
49506	Bilateral inguinal hernia repair	0.15	600	496
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$466	\$382
Coefficient of Variation			24.1%	19.1

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 5-8

## COLLAPSED PROCEDURE PACKAGE: HIP RECONSTRUCTION AND REPLACEMENT

CPT-4 Code	Procedure	Frequency (n = 424)	Usual Charge	Medicare Reasonable
27125	Arthroplasty; prosthesis	0.37	\$1,173	\$932
27126	cup	0.05	1,238	882
27127	cup with acetabuloplasty	0.01	1,240	1,150
-----				
Collapsed <u>Arthroplasty Procedure Package Price</u>		0.43	\$1,182	\$931
Coefficient of Variation			15.6%	11.2%
-----				
27130	Total hip replacement, arthroplasty, acetabular and proximal femoral prosthetic replacement; simple	0.50	\$2,059	\$1,659
27131	Total hip replacement, arthroplasty, acetabular and proximal femoral prosthetic replacement; complex	0.07	2,287	1,697
-----				
Collapsed <u>Total Hip Replacement Procedure Package Price</u>		0.57	\$2,089	\$1,663
Coefficient of Variation			22.2%	15.4%
-----				
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$1,699	\$1,349
Coefficient of Variation			34.2%	30.9%

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 5-9

## COLLAPSED PROCEDURE PACKAGE: TRANSURETHRAL RESECTION OR PROSTATE, PROSTATECTOMY

CPT-4 Code	Procedure	Frequency (n = 2,431)	Usual Charge	Medicare Reasonable
52601	Transurethral resection of prostrate, including control of postoperative bleeding during hospitalization, complete (vasectomy, meatotomy, cystourethroscopy, urethral calibration and/or dilation, and internal urethrotomy are included)	0.95	\$902	\$685
Coefficient of Variation				
55801	Prostatectomy, including control of postoperative bleeding during initial hospitalization, complete (vasectomy, meatotomy, urethral calibration and/or dilation, and internal urethrotomy are included); perineal, subtotal	a	\$813	\$716
55810	perineal, radical	a	1,289	1,122
55821	suprapubic, subtotal, one or two stages	0.03	929	793
55831	retropubic, subtotal	a	883	739
55840	retropubic, radical	0.01	1,447	979
55845	retropubic, radical, with bilateral pelvic lymphadenectomy, including external iliac, hypogastric and obturator nodes	a	2,065	1,497
Collapsed Prostatectomy Procedure Package Price				
Coefficient of Variation		0.05	\$1,099	\$888
TOTAL COLLAPSED PROCEDURE PACKAGE PRICE		1.00	\$913	\$696
Coefficient of Variation			17.7%	11.3%

<sup>a</sup>Frequency less than 1 percent.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 6-1

DIABETES OFFICE VISIT PACKAGES FOR NEW AND ESTABLISHED PATIENTS<sup>a</sup>

	New Visits (7.7%)	Old Visits (92.3%)	All Visits N = 6,752
Office Visit	\$24.28 (1.00)	\$14.68 (1.00)	\$15.41 (1.00)
X-rays	27.34 (0.06)	27.20 (0.03)	27.21 (0.03)
ECGs	26.88 (0.12)	29.19 (0.03)	28.65 (0.04)
Injections	3.92 (0.07)	5.09 (0.07)	5.00 (0.07)
Laboratory Tests	25.88 (0.26)	24.35 (0.38)	24.43 (0.37)
-----			
Total Package Price (package physician)	\$34.37	\$25.42	\$26.11
Coefficient of Variation	95.6%	117.0%	115.3%
-----			
Total Package Price	\$36.03	\$26.17	\$26.92
Coefficient of Variation	97.2%	117.1%	116.0%
-----			
Percent of All Charges from Package Physician	97.7%	98.7%	98.6%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-2

DIABETES OFFICE VISIT PACKAGES BY SPECIALTY<sup>a</sup>

	GP-DO (12.2%)		GP-MD (22.7%)		General Surgeon (5.7%)		Multi-Spec. Group (17.7%)		Internist (34.6%)		Medical Specialist (2.9%)		Surgical Specialist (2.6%)		Other (1.6%)		
Office Visit	\$14.21 (1.00)	\$13.62 (1.00)	\$14.52 (1.00)	\$16.74 (1.00)	\$16.27 (1.00)	\$16.54 (1.00)	\$16.71 (1.00)	\$15.98 (1.00)									
X-rays	22.86 (0.03)	26.32 (0.03)	47.28 (0.03)	22.05 (0.04)	27.56 (0.04)	28.40 (0.07)	24.53 (0.02)	44.03 (0.04)									
ECGs	43.62 (0.03)	30.88 (0.03)	20.88 (0.01)	20.87 (0.01)	27.53 (0.07)	25.78 (0.12)	24.98 (0.02)	2.40 (0.01)									
Injections	4.95 (0.14)	5.04 (0.12)	2.64 (0.09)	4.28 (0.20)	5.79 (0.30)	10.97 (0.03)	4.53 (0.16)	5.77 (0.28)									
Laboratory Tests	22.71 (0.49)	21.83 (0.42)	20.81 (0.21)	52.58 (0.16)	19.88 (0.43)	27.53 (0.47)	24.42 (0.42)	64.73 (0.37)									
Total Package Price (package physician)	\$26.68	\$24.33	\$19.40	\$25.63	\$26.90	\$33.26	\$28.02	\$42.59									
Coefficient of Variation	111.9%	130.6%	82.5%	129.8%	93.9%	90.8%	133.0%	150.0%									
Total Package Price	\$27.72	\$24.81	\$20.76	\$26.19	\$27.88	\$34.74	\$28.57	\$42.96									
Coefficient of Variation	116.7%	131.1%	100.8%	127.6%	96.8%	89.5%	131.2%	148.6%									
Percent of All Charges from Package Physician	98.7%	99.0%	98.3%	98.7%	98.3%	97.6%	98.8%	99.0%									

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-3

DIABETES OFFICE VISIT PACKAGES FOR NEW PATIENTS BY SPECIALTY<sup>a</sup>

	General				Multi-Spec.		Medical		Surgical	
	GP-DO (6.0%)	GP-MD (21.7%)	Surgeon (6.8%)	Group (13.7%)	Internist (42.9%)	Specialist (1.7%)	Specialist (5.2%)	Other (1.9%)		
Office Visit	\$22.01 (1.00)	\$18.87 (1.00)	\$19.00 (1.00)	\$33.74 (1.00)	\$24.35 (1.00)	\$31.32 (1.00)	\$26.95 (1.00)	\$28.24 (1.00)		
X-rays	46.50 (0.03)	17.10 (0.03)	50.33 (0.11)	18.84 (0.10)	26.03 (0.07)	--	--	--		
ECGs	24.90 (0.03)	23.20 (0.07)	15.92 (0.06)	21.73 (0.10)	29.51 (0.17)	25.85 (0.44)	23.25 (0.04)	--		
Injections	3.10 (0.06)	4.35 (0.10)	--	--	3.67 (0.10)	--	--	5.20 (0.20)		
Laboratory Tests	21.27 (0.35)	24.96 (0.36)	33.0 (0.09)	19.21 (0.10)	28.18 (0.28)	25.70 (0.55)	16.25 (0.15)	30.50 (0.20)		
Total Package Price (package physician)	\$30.56	\$29.87	\$22.59	\$37.58	\$37.65	\$57.09	\$29.36	\$35.38		
Coefficient of Variation	55.2%	131.7%	83.2%	39.6%	99.8%	70.3%	40.5%	68.4%		
Total Package Price	\$32.06	\$30.32	\$28.49	\$39.64	\$39.39	\$57.09	\$30.22	\$35.38		
Coefficient of Variation	57.2%	129.9%	138.9%	40.0%	100.1%	70.3%	40.8%	68.4%		
Percent of All Charges from Package Physician	97.9%	98.9%	95.0%	96.3%	97.8%	100.0%	98.2%	100.0%		

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.



TABLE B 6-4

## DIABETES OFFICE VISIT PACKAGES FOR ESTABLISHED PATIENTS BY SPECIALTY

	GP-DO (12.7%)		GP-MD (22.7%)		General Surgeon (5.6%)		Multi-Spec. Group (18.0%)		Internist Specialist (33.9%)		Medical Specialist (3.0%)		Surgical Specialist (2.4%)		Other (1.6%)	
Office Visit	\$13.90 (1.00)	\$13.20 (1.00)	\$14.07 (1.00)	\$15.67 (1.00)	\$15.42 (1.00)	\$15.84 (1.00)	\$14.86 (1.00)	\$14.74 (1.00)	\$15.42 (1.00)	\$15.84 (1.00)	\$14.86 (1.00)	\$14.74 (1.00)	\$15.42 (1.00)	\$15.84 (1.00)	\$14.86 (1.00)	\$14.74 (1.00)
X-rays	22.78 (0.03)	27.05 (0.03)	45.75 (0.02)	22.63 (0.03)	27.87 (0.04)	28.40 (0.07)	24.53 (0.02)	44.03 (0.04)	27.87 (0.04)	28.40 (0.07)	24.53 (0.02)	44.03 (0.04)	27.87 (0.04)	28.40 (0.07)	24.53 (0.02)	44.03 (0.04)
EKGs	44.56 (0.03)	32.81 (0.02)	25.85 (0.01)	19.87 (0.01)	26.89 (0.05)	25.77 (0.10)	25.85 (0.01)	2.40 (0.01)	26.89 (0.05)	25.77 (0.10)	25.85 (0.01)	2.40 (0.01)	26.89 (0.05)	25.77 (0.10)	25.85 (0.01)	2.40 (0.01)
Injections	4.98 (0.14)	5.08 (0.12)	2.64 (0.09)	4.28 (0.02)	6.77 (0.02)	10.97 (0.03)	4.53 (0.19)	5.81 (0.28)	6.77 (0.02)	10.97 (0.03)	4.53 (0.19)	5.81 (0.28)	6.77 (0.02)	10.97 (0.03)	4.53 (0.19)	5.81 (0.28)
Laboratory Tests	22.75 (0.49)	21.62 (0.42)	20.34 (0.22)	53.87 (0.16)	19.34 (0.45)	27.63 (0.47)	24.88 (0.47)	66.53 (0.38)	19.34 (0.45)	27.63 (0.47)	24.88 (0.47)	66.53 (0.38)	19.34 (0.45)	27.63 (0.47)	24.88 (0.47)	66.53 (0.38)
Total Package Price (package physician)	\$26.53	\$23.89	\$19.08	\$24.87	\$25.77	\$32.12	\$27.78	\$43.32	\$25.77	\$32.12	\$27.78	\$43.32	\$25.77	\$32.12	\$27.78	\$43.32
Coefficient of Variation	114.0%	130.1%	82.3%	136.5%	90.4%	91.2%	144.8%	153.8%	90.4%	91.2%	144.8%	153.8%	90.4%	91.2%	144.8%	153.8%
Total Package Price	\$27.55	\$24.37	\$19.99	\$25.34	\$26.67	\$33.68	\$28.27	\$43.73	\$26.67	\$33.68	\$28.27	\$43.73	\$26.67	\$33.68	\$28.27	\$43.73
Coefficient of Variation	118.8%	130.9%	89.9%	134.4%	92.7%	90.1%	143.0%	152.2%	92.7%	90.1%	143.0%	152.2%	92.7%	90.1%	143.0%	152.2%
Percent of All Charges From Package Physician	98.8%	99.1%	98.7%	98.8%	98.4%	97.6%	99.0%	98.9%	98.4%	97.6%	99.0%	98.9%	98.4%	97.6%	99.0%	98.9%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-5

DIABETES OFFICE VISIT PACKAGES BY LOCALITY<sup>a</sup>

	Detroit (61.0%)	Other Urban (18.9%)	Rural (20.1%)
Office Visit	\$16.56 (1.00)	\$14.31 (1.00)	\$12.99 (1.00)
X-rays	28.44 (0.04)	26.12 (0.03)	23.68 (0.03)
ECGs	28.00 (0.05)	31.47 (0.03)	29.00 (0.02)
Injections	4.73 (0.09)	5.49 (0.06)	6.46 (0.03)
Laboratory Tests	29.00 (0.42)	15.86 (0.36)	12.70 (0.25)
-----			
Total Package Price (package physician)	\$30.63	\$21.32	\$16.88
Coefficient of Variation	115.2%	90.7%	85.1%
-----			
Total Package Price	\$31.45	\$22.07	\$17.73
Coefficient of Variation	115.4%	90.3%	100.4%
-----			
Percent of All Charges from Package Physician	98.7%	98.4%	98.5%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-6

DIABETES OFFICE VISIT PACKAGES FOR NEW PATIENTS BY LOCALITY<sup>a</sup>

	Detroit (48.4%)	Other Urban (17.4%)	Rural (34.2%)
Office Visit	\$28.29 (1.00)	\$23.88 (1.00)	\$18.81 (1.00)
X-rays	28.65 (0.08)	22.30 (0.04)	26.47 (0.04)
ECGs	24.96 (0.14)	35.13 (0.17)	21.21 (0.07)
Injections	3.71 (0.12)	3.88 (0.06)	6.02 (0.02)
Laboratory Tests	35.62 (0.26)	16.28 (0.39)	16.58 (0.19)
-----			
Total Package Price (package physician)	\$41.61	\$36.54	\$23.04
Coefficient of Variation	93.3%	87.1%	77.3%
-----			
Total Package Price	\$43.93	\$37.27	\$24.25
Coefficient of Variation	95.0%	85.9%	81.3%
-----			
Percent of All Charges From Package Physician	97.2%	98.7%	98.0%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-7

DIABETES OFFICE VISIT PACKAGES FOR ESTABLISHED PATIENTS BY LOCALITY<sup>a</sup>

	Detroit (62.1%)	Other Urban (19.0%)	Rural (18.9%)
Office Visit	\$15.80 (1.00)	\$13.58 (1.00)	\$12.11 (1.00)
X-rays	28.41 (0.04)	26.57 (0.03)	23.12 (0.03)
ECGs	29.70 (0.04)	29.19 (0.02)	32.90 (0.02)
Injections	4.82 (0.09)	5.60 (0.06)	6.49 (0.03)
Laboratory Tests	28.73 (0.43)	15.83 (0.36)	12.28 (0.26)
-----			
Total Package Price (package physician)	\$29.91	\$20.16	\$15.96
Coefficient of Variation	116.8%	86.9%	84.8%
-----			
Total Package Price	\$30.65	\$20.92	\$16.75
Coefficient of Variation	116.7%	87.0%	103.2%
-----			
Percent of All Charges from Package Physician	98.7%	98.4%	98.5%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-8

## HYPERTENSION OFFICE VISIT PACKAGES FOR ESTABLISHED PATIENTS BY SPECIALTY

	GP-DO (11.6%)		GP-MD (24.0%)		General Surgeon (7.2%)		Multi-Spec. Group (16.6%)		Internist Specialist (34.1%)		Medical Specialist (3.6%)		Surgical Specialist (1.7%)		Other (1.2%)			
Office Visit	\$14.13 (1.00)	\$13.55 (1.00)	\$14.19 (1.00)	\$15.29 (1.00)	\$15.51 (1.00)	\$15.86 (1.00)	\$14.79 (1.00)	\$14.80 (1.00)										
X-rays	28.91 (0.03)	32.93 (0.03)	30.22 (0.04)	27.32 (0.04)	32.11 (0.03)	21.77 (0.03)	34.73 (0.03)	29.24 (0.04)										
ECGs	36.53 (0.02)	34.31 (0.03)	23.99 (0.02)	36.33 (0.02)	31.15 (0.06)	32.12 (0.08)	25.25 (0.02)	24.94 (0.03)										
Injections	5.65 (0.18)	5.08 (0.17)	3.33 (0.10)	5.78 (0.06)	14.11 (0.03)	5.37 (0.01)	5.42 (0.20)	5.88 (0.20)										
Laboratory Tests	42.51 (0.21)	41.61 (0.21)	39.30 (0.10)	52.76 (0.11)	45.46 (0.21)	44.09 (0.16)	50.78 (0.20)	56.06 (0.23)										
Total Package Price (package physician)	\$25.04	\$24.16	\$18.84	\$22.39	\$27.46	\$25.34	\$26.79	\$30.41										
Coefficient of Variation	142.2%	147.3%	146.8%	129.8%	139.9%	117.9%	192.3%	156.7%										
Total Package Price	\$25.63	\$24.97	\$19.95	\$23.10	\$28.63	\$26.08	\$27.41	\$30.95										
Coefficient of Variation	140.8%	148.5%	145.4%	130.0%	139.9%	117.0%	189.0%	154.6%										
Percent of All Charges from Package Physician	98.8%	98.7%	98.0%	98.7%	98.2%	98.6%	98.9%	99.1%										

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency for each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-9

HYPERTENSION OFFICE VISIT PACKAGES FOR ESTABLISHED PATIENTS BY LOCALITY<sup>a</sup>

	Detroit (68.1%)	Other Urban (15.6%)	Rural (16.3%)
Office Visit	\$15.68 (1.00)	\$13.32 (1.00)	\$12.18 (1.00)
X-rays	33.10 (0.03)	30.91 (0.04)	20.42 (0.03)
ECGs	31.31 (0.05)	33.39 (0.03)	36.72 (0.02)
Injections	6.42 (0.11)	5.38 (0.09)	5.53 (0.04)
Laboratory Tests	50.47 (0.21)	28.96 (0.15)	21.66 (0.12)
-----			
Total Package Price (package physician)	\$28.34	\$19.11	\$15.90
Coefficient of Variation	141.6%	117.9%	118.1%
-----			
Total Package Price	\$29.25	\$20.31	\$16.52
Coefficient of Variation	141.2%	125.7%	118.1%
-----			
Percent of All Charges from Package Physician	98.6%	98.0%	98.5%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency of each package procedure is shown in parentheses.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 6-10

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR OFFICE VISITS FOR DIABETES

	Regressions				Means
	(1)	(2)	(3)	(4)	
Total Package Price	--	--	--	--	26.96
Specialty of Physician <sup>a</sup>					
General Surgeon	-4.04**	-4.05**	-4.28**	1.38	0.06
GP-DO	2.94**	1.89	2.30*	1.00	0.12
Internist	3.14***	.25	-0.21	-0.63	0.35
Multi. Spec. Group	1.43	-3.40**	-3.48**	6.04**	0.18
Medical Specialist	9.94***	6.02***	6.07***	2.34	0.03
Surgical Specialist	3.76	1.31	0.26	1.71	0.03
Other	18.15***	13.66***	13.09***	15.49***	0.02
Location <sup>a</sup>					
Detroit		10.14**	10.26***	5.87***	0.61
Rural		-3.47	-4.19***	-1.58	0.20
Patient Type <sup>a</sup>					
Established Patient			-11.95***	-9.71***	0.92
Patient Sex <sup>a</sup>					
Male			0.80	0.55	0.37
Patient Age <sup>a</sup>					
Over age 70			-0.72	-1.02	0.31
Services Provided <sup>a</sup>					
Chest X-Ray				23.36***	0.02
Other X-Ray				38.49***	0.02
ECG				40.61***	0.04
Injections				6.25***	0.07
Laboratory Tests				24.83***	0.37
CONSTANT	24.81***	21.55***	32.75***	18.90***	
R <sup>2</sup>	.01	4.2	5.27	32.7	
(df)	(7,6744)	(9,6742)	(12,6739)	(17,6734)	
F	9.63***	33.16***	31.31***	192.43***	

<sup>a</sup>General Practitioner MD, other SMSA, new patients, female patients, patients' less than age 70, no ancillary services are in the intercept.

\*\*\* Significant at one percent level.

\*\* Significant at five percent level.

\* Significant at ten percent level.

Source: Michigan 1981 Part B Medicare Claims Data.

TABLE B 7-1

SPECIAL PROCEDURE PACKAGE BY LOCATION: DIAGNOSTIC COLONOSCOPY<sup>a</sup>

Procedures	Hospital (78.5%)	Outpatient Department (14.0%)	Physician's Office (7.0%)	All Locations <sup>c</sup> (n = 358)
Surgeon	\$255.45 (1.00)	\$248.47 (1.00)	\$153.00 (1.00)	\$246.80 (1.00)
Same Day Visit	17.31 (0.40)	14.39 (0.02)	33.52 (0.28)	17.84 (0.35)
X-rays <sup>b</sup>	29.15 (0.34)	24.75 (0.08)	40.12 (0.26)	30.39 (0.31)
-----				
Total Package Price	\$272.31	\$250.74	\$172.81	\$262.05
Coefficient of Variation	31.7%	33.7%	62.7%	34.7%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency (by location) for each package procedure is shown in parentheses.

<sup>b</sup>Includes barium enema.

<sup>c</sup>Locations shown represent 99 percent of total sample.

Source: South Carolina 1981 Medicare Part B Claims Data.



TABLE B 7-2

SPECIAL PROCEDURE PACKAGE BY SPECIALTY: DIAGNOSTIC BRONCHOSCOPY<sup>a</sup>

Procedures	General Surgeon (41.3%)	Internist (12.1%)	Pulmonary Disease (18.8%)	Thoracic Surgeon (12.8%)	Multi-Specialty Group (11.0%)	All MDs <sup>b</sup> (n = 1,338)
Surgeon	\$168.22 (1.00)	\$178.88 (1.00)	\$185.35 (1.00)	\$161.75 (1.00)	\$193.93 (1.00)	\$173.67 (1.00)
Anesthesiologist	104.54 (0.22)	105.81 (0.09)	111.18 (0.07)	105.65 (0.39)	127.60 (0.01)	105.38 (0.18)
Same Day Visit	15.09 (0.13)	15.57 (0.51)	17.69 (0.64)	14.63 (0.08)	20.17 (0.42)	17.00 (0.30)
-----						
Total Package Price	\$192.91	\$196.00	\$204.67	\$203.64	\$203.30	\$197.40
Coefficient of Variation	35.1%	27.9%	25.0%	44.0%	18.4%	33.4%

<sup>a</sup> Dollar values represent Medicare reasonable charges. Relative frequency (by specialty) for each physician service is provided in parentheses.

<sup>b</sup> Specialties shown represent 96 percent of total physician sample.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-3

SPECIAL PROCEDURE PACKAGE BY SPECIALTY: DIAGNOSTIC SIGMOIDOSCOPY<sup>a</sup>

Procedures	General Practitioner (7.3%)	General Surgeon (56.3%)	Gastro- enterologist (12.4%)	Internist (15.5%)	All MDs <sup>c</sup> (n = 549)
Surgeon	\$31.80 (1.00)	\$56.26 (1.00)	\$80.18 (1.00)	\$41.04 (1.00)	\$53.61 (1.00)
Same Day Visit	17.37 (0.80)	16.30 (0.16)	19.64 (0.44)	28.08 (0.49)	19.69 (0.32)
X-rays <sup>b</sup>	27.68 (0.18)	35.15 (0.48)	33.49 (0.32)	32.93 (0.32)	34.29 (0.41)
-----					
Total Package Price	\$50.54	\$75.73	\$99.68	\$65.37	\$74.08
Coefficient of Variation	36.1%	37.2%	31.4%	50.6%	42.0%

<sup>a</sup> Dollar values represent Medicare reasonable charges. Relative frequency (by specialty) for each physician service is found in parentheses.

<sup>b</sup> Includes barium enema.

<sup>c</sup> Specialties shown represent 92 percent of total physician sample.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-4

SPECIAL PROCEDURE PACKAGE BY SPECIALTY: DIAGNOSTIC PROCTOSIGMOIDOSCOPY<sup>a</sup>

	General Practice (10.9%)	Family Practice (7.3%)	General Surgery (21.4%)	Internal Medicine (38.5%)	Procto- logist (6.2%)	Gastro- entero- logist (5.4%)	Cardio- logist (3.3%)	Multi- Specialty Group (3.5%)	All MDSc (n = 1,51
Surgeon	\$22.69 (1.00)	\$23.51 (1.00)	\$34.58 (1.00)	\$22.13 (1.00)	\$30.66 (1.00)	\$24.23 (1.00)	\$25.48 (1.00)	\$26.77 (1.00)	\$26.31 (1.00)
Same Day Visit	22.89 (0.77)	19.61 (0.62)	18.20 (0.27)	33.84 (0.79)	11.80 (0.08)	30.60 (0.48)	38.52 (0.85)	15.64 (0.55)	28.52 (0.59)
X-rays <sup>b</sup>	31.83 (0.26)	34.05 (0.32)	32.42 (0.40)	38.00 (0.19)	40.29 (0.07)	32.69 (0.26)	27.00 (0.02)	36.03 (0.53)	34.46 (0.26)
-----									
Total Package Price	\$48.57	\$45.54	\$52.57	\$56.16	\$34.50	\$47.18	\$58.59	\$54.29	\$52.11
Coefficient of Variation	36.5%	41.4%	46.9%	42.6%	38.7%	57.4%	36.1%	43.4%	44.9%

<sup>a</sup> Dollar values represent Medicare reasonable charges. Relative frequency (by specialty) for each physician service is shown in parentheses.

<sup>b</sup> Includes barium enema.

<sup>c</sup> Specialties shown represent 97 percent of total physician sample.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-5

SPECIAL PROCEDURE PACKAGE BY LOCATION: DIAGNOSTIC UPPER GI ENDOSCOPY<sup>a</sup>

Procedures	Hospital (80.8%)	Outpatient Department (15.4%)	All Locations <sup>c</sup> (n = 762)
Surgeon	\$188.40 (1.00)	\$189.16 (1.00)	\$188.17 (1.00)
Same Day Visit	17.78 (0.28)	31.86 (0.07)	18.51 (0.30)
X-rays <sup>b</sup>	30.59 (0.32)	33.71 (0.10)	30.71 (0.33)
-----			
Total Package Price	\$206.54	\$194.79	\$203.94
Coefficient of Variation	20.7%	20.2%	21.0%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency (by location) for each physician service is shown in parentheses.

<sup>b</sup>Includes upper GI radiologic exam.

<sup>c</sup>Locations shown represent 96 percent of total sample locations.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-6

SPECIAL PROCEDURE PACKAGE: CORONARY ARTERY BYPASS GRAFTS<sup>a</sup>

Procedures	% Accepting Assignment	All Cases (n = 236)	One or Two Grafts (11%)	Three or More Grafts (89%)
Surgeon	80%	\$3,072 (1.00)	\$2,717 (1.00)	\$3,229 (1.00)
Assistant Surgeon	70%	604 (1.00)	526 (1.00)	639 (1.00)
Anesthesiologist	67%	490 (1.00)	453 (1.00)	507 (1.00)
-----				
Total Package Price		\$4,166	\$3,697	\$4,376
Coefficient of Variation		11.6%	10.6%	8.2%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency (by procedure) for each physician service is shown in parentheses.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-7

SPECIAL PROCEDURE PACKAGE BY SPECIALTY: LEFT HEART CATHETERIZATION<sup>a</sup>

	Cardiologist (65.1%)	Internist (19.3%)	Multi-Specialty Group (14.6%)	All MDs <sup>c</sup> (n = 522)
Surgeon - Initial Left Catheterization	\$516 (1.00)	\$442 (1.00)	\$526 (1.00)	\$500 (1.00)
Surgeon - Additional Left Catheterization	380 (0.02)	475 (0.01)	272 (0.03)	369 (0.02)
Surgeon - Right Heart Catheterization	172 (0.03)	200 (0.01)	35 (0.01)	162 (0.02)
Other Catheterization Procedures	83 (0.24)	--	75 (0.01)	79 (0.15)
Catheterization X-Ray	75 (0.12)	58 (0.20)	77 (0.07)	70 (0.13)
-----				
Total Package Price	\$539	\$461	\$540	\$521
Coefficient of Variation	21.6%	28.3%	21.9%	24.3%
Percent MDs Accepting Assignment <sup>b</sup>	29.7%	23.8%	100%	38.8%

<sup>a</sup>Dollars are Medicare reasonable charges. The relative frequency of each physician service provided is in parentheses.

<sup>b</sup>Initial procedure only.

<sup>c</sup>Specialties shown represent 100 percent of total physician sample.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-8

SPECIAL PROCEDURE PACKAGE BY TYPE OF PROCEDURE: LENS EXTRACTION<sup>a</sup>

	Aspiration (1.7%)	Intra- capsular (32.9%)	Extra- capsular (6.5%)	Extraction With Prosthesis (56.7%)	All Procedures (n = 3,071)
Surgeon	\$688 (1.00)	\$663 (1.00)	\$683 (1.00)	\$1,149 (1.00)	\$942 (1.00)
Assistant Surgeon	--	126 (0.01)	185 (0.01)	223 (0.04)	211 (0.03)
Anesthesiologist	176 (1.00)	178 (1.00)	142 (1.00)	171 (1.00)	156 (1.00)
-----					
Total Package Price	\$865	\$794	\$826	\$1,328	\$1,146
Coefficient of Variation	12.9%	10.2%	7.7%	9.5%	23.8%
Percent MDs Accepting Assignment <sup>b</sup>	35.8%	46.5%	34.3%	93.9%	41.6%

<sup>a</sup> Dollar values represent Medicare reasonable charges. Relative frequency (by procedure) for each physician service is shown in parentheses.

<sup>b</sup> Assignment rate for surgical procedure only.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-9

SPECIAL PROCEDURE PACKAGE BY SPECIALTY: PERMANENT TRANSVENOUS PACEMAKER INSERTION<sup>a</sup>

	General Surgeon (58.8%)	Cardio- logist (11.0%)	Internist (3.2%)	Thoracic Surgeon (25.0%)	Multi- Specialty Group (2.0%)	All MDS <sup>b</sup> (n = 653)	Percent Accepting Assignment
Surgeon	\$669 (1.00)	\$699 (1.00)	\$671 (1.00)	\$661 (1.00)	\$390 (1.00)	\$665 (1.00)	69.4%
Assistant Surgeon	127 (0.03)	--	--	--	--	127 (0.02)	83.3
Anesthesiologist	130 (0.20)	152 (0.72)	--	146 (0.26)	--	141 (0.26)	83.6
Pacemaker Repair	261 (0.02)	254 (0.05)	--	337 (0.02)	--	274 (0.02)	66.7
Operative Fluoroscopy	27 (0.19)	--	--	36 (0.09)	--	28 (0.14)	96.6
-----							
Total Package Price	\$710	\$823	\$671	\$708	\$390	\$715	
Coefficient of Variation	13.3%	12.5%	14.9%	13.7%	42.8%	16.0%	

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency by specialty for each physician service is shown in parentheses.

<sup>b</sup>Specialties shown represent 100 percent of total physician sample.

Source: South Carolina 1981 Medicare Part B Claims Data.



TABLE B 7-10

SPECIAL PROCEDURE PACKAGE: TRANSURETHRAL RESECTION OF PROSTATE (TURP), PROSTATECTOMY<sup>a</sup>

Procedures	All (n = 2,431)	TURP (94.6%)	Suprapubic Prostatectomy (3.2%)	Other <sup>b</sup> Prostatectomy (2.1%)
Surgeon	\$695 (1.00)	\$685 (1.00)	\$793 (1.00)	\$1,032 (1.00)
Assistant Surgeon	174 (0.03)	113 (c)	160 (.44)	200 (0.62)
Anesthesiologist	111 (1.00)	107 (1.00)	160 (1.00)	190 (1.00)
Prostate Biopsy	42 (0.01)	42 (0.03)	33 (0.03)	39 (0.10)
-----				
Total Package Price	\$813	\$793	\$1,025	\$1,353
Coefficient of Variation	14.8%	7.0%	13.6%	27.3%
Percent MDs Accepting Assignment <sup>d</sup>	50.1%	50.1%	59.5%	38.5%

<sup>a</sup>Dollar values represent Medicare reasonable charges. Relative frequency (by procedure) for each physician service is shown in parentheses.

<sup>b</sup>Perineal and retropubic.

<sup>c</sup>Frequency less than 1 percent.

<sup>d</sup>Assignment rate includes fee for surgical procedure only.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 7-11

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR HIP REPLACEMENT/RECONSTRUCTION

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	1651
Type of Procedure <sup>a</sup>				
Total Hip Replacement	942.20***	794.79***	789.45***	0.57
Assistant Surgeon <sup>b</sup>		385.96***	376.35***	0.29
Patient received x-rays <sup>c</sup>			67.16**	0.58
CONSTANT	1112.69***	1048.82***	1036.49***	
R <sup>2</sup>	0.74	0.83	0.83	
(df)	(1,418)	(2,417)	(3,416)	
F	1169.48***	967.41***	651.89***	

<sup>a</sup>Arthroplasty (reconstruction) is in intercept.

<sup>b</sup>No assistant surgeon is in intercept.

<sup>c</sup>No x-rays are in intercept.

\*\*\* Significant at one percent level.

\*\* Significant at five percent level.

\* Significant at ten percent level.

Source: South Carolina 1981 Part B Medicare Claims Data.

TABLE B 8-1

## SPECIALTY DIFFERENCES IN THREE-MONTH CONDITION PACKAGES FOR DIABETES

	Specialty of Package Physician <sup>a</sup>				
	GP-DO (11.2%)	GP-MD (22.7%)	Internist (36.1%)	General Surgeon (5.8%)	Multi-Spec. Group (16.3%)
No. of Visits to Package Physician	3.3	2.9	2.3	2.3	2.3
Percent of Cases:					
Second Physician Involved	28.4%	30.5%	32.2%	32.1%	27.4%
X-Rays	23.9	19.8	26.6	21.5	22.4
ECGs	18.9	13.8	21.7	10.0	12.0
Injections	24.9	19.9	5.4	14.4	5.1
Office Surgery	19.4	12.3	16.5	14.4	18.6
Lab Tests	77.6	70.7	69.8	53.1	30.8
No. of Lab Tests <sup>b</sup>	8.7	7.4	6.7	6.5	10.9
-----					
Total Ambulatory Package Price	\$167.19	\$131.44	\$137.49	\$115.88	\$130.06
Coefficient of Variation	118%	139%	134%	125%	178%
-----					
Percent of Pts. Hospitalized	19.1%	17.0%	21.2%	25.8%	14.7%
Total Condition Package Price	\$338.85	\$262.92	\$319.46	\$322.05	\$286.51
Coefficient of Variation	180%	180%	180%	185%	216%
% of Total Price Attributed to Package Physician	63.8%	63.1%	58.2%	61.8%	65.1%

<sup>a</sup>Specialties shown represent 92 percent of total physician sample.

<sup>b</sup>For patients with lab tests only.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 8-2

## GEOGRAPHIC DIFFERENCES IN THREE-MONTH CONDITION PACKAGES FOR DIABETES

	Location		
	<u>Detroit</u> (60.7%)	<u>Other SMSAs</u> (18.6%)	<u>Non-SMSAs</u> (20.6%)
No. of Visits to Package Physician	2.6	2.6	2.5
Percent of Cases:			
Second Physician Involved	34.0%	30.7%	26.8%
X-Rays	25.6	23.4	18.4
ECGs	20.9	16.0	9.9
Injections	13.2	10.6	9.3
Office Surgery	20.1	13.8	9.2
Lab Tests	66.3	66.4	53.5
No. of Lab Tests <sup>a</sup>	9.0	6.0	4.3
-----			
Total Ambulatory Package Price	\$171.99	\$107.58	\$75.43
Coefficient of Variation	133%	108%	117%
-----			
Percent of Pts. Hospitalized	17.8%	21.9%	20.4%
Total Condition Package Price	\$342.59	\$278.07	\$228.18
Coefficient of Variation	170%	189%	240%
% of Total Price Attributed to Package Physician	57.3%	61.5%	70.2%

<sup>a</sup>For patients with any lab tests.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 8-3

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR THREE-MONTH CONDITION PACKAGES FOR DIABETES

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	140.07
Specialty of Package Physician <sup>a</sup> :				
GP-DO	35.74***	27.28**	4.89	0.11
General Surgeon	-15.56	-11.80	2.25	0.06
Internist	6.05	-11.44	2.54	0.36
Medical Specialist	21.21	-7.03	7.58	0.03
Surgical Specialist	45.45**	22.28	-4.01	0.03
Multi-Specialty Group	-1.38	-25.86**	10.74**	0.16
Other Specialist	86.34***	68.28***	0.44	0.02
Location <sup>b</sup> :				
Detroit	--	95.93***	14.63***	0.61
Other SMSA	--	24.67**	-4.59	0.19
Patient is 75 years+	--	-15.12**	-3.72	0.37
Patient is Female	--	-4.38	-4.46	0.62
Patient has Second DX	--	64.86***	-0.04	0.25
No. of Visits to Package Physician	--	--	8.95***	2.56
No. of Visits to Other Physicians	--	--	16.72***	0.65
No. of X-Rays	--	--	36.45***	0.49
No. of Lab Tests	--	--	10.47***	4.84
No. of ECGs	--	--	39.13***	0.25
No. of Injections	--	--	5.63***	0.64
No. of Office Surgical Procedures	--	--	35.84***	0.41
No. of Other Tests	--	--	59.36***	0.16
Constant	131.44***	73.70***	-6.25	--
R <sup>2</sup>	0.008	0.08	0.78	
df	(7,3573)	(12,3568)	(20,3560)	
F	4.28***	25.19***	621.92***	

<sup>a</sup>GP-MDs are in the intercept.

<sup>b</sup>Rural areas are in the intercept.

\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 8-4

VARIATIONS IN PRICE AND INPUTS AS A FUNCTION OF PACKAGE PHYSICIAN'S  
WILLINGNESS TO TAKE ASSIGNMENT: THREE-MONTH CONDITION PACKAGE FOR DIABETES

	Package Physician Accepts Assignment		
	Never (47.1%)	Sometimes (9.0%)	Always (43.9%)
No. of Visits to Package Physician	2.3	3.3	2.6
Percent of Cases:			
Second Physician involved	31.5%	31.2%	32.4%
X-rays	14.3	26.9	18.6
ECGs	11.3	51.2	17.6
Injections	8.0	16.3	15.3
Office Surgery	13.8	25.0	18.1
Lab Tests	67.7	79.6	56.1
Other Tests	6.1	15.1	9.4
-----			
Total Ambulatory Package Price	\$103.53	\$243.38	\$157.94
-----			
Percent of Patients Hospitalized	17.9%	34.6%	17.2%
Total Condition Package Price	\$254.44	\$481.90	\$189.26
% of Total Package Taken on Assignment	27.8%	73.3%	97.3%

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 9-1

INPATIENT CONDITION PACKAGES FOR HIP ARTHROPLASTY (RECONSTRUCTION) AND REPLACEMENT<sup>a</sup>

	Hip Arthroplasty (n = 182)		Total Hip Replacement (n = 242)	
Surgeon	\$ 931	(1.00)	\$ 1,663	(1.00)
Assistant Surgeon	173	(0.07)	337	(0.46)
Anesthesiologist	152	(1.00)	218	(1.00)
Other Surgery <sup>b</sup>	541	(0.09)	697	(0.19)
Routine Hospital Visits	182	(0.41)	211	(0.34)
Concurrent Care Visits	191	(0.14)	163	(0.16)
Consultations	54	(0.40)	61	(0.53)
Hip X-rays	18	(0.55)	20	(0.70)
Other X-rays	30	(0.63)	37	(0.78)
ECGs	13	(0.67)	11	(0.78)
Lab Tests	45	(0.13)	53	(0.06)
Other Services	176	(0.09)	58	(0.08)
-----				
Total Package Price	\$1,327		\$2,361	
Coefficient of Variation	27.9%		27.5%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

<sup>b</sup>Includes surgeon's, assistant surgeon's, and anesthesiologist's fees.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 9-2

INPATIENT CONDITION PACKAGES FOR CORONARY ARTERY BYPASS GRAFTS (CABGs): BY DRG<sup>a</sup>

	DRG #106		DRG #107		All CABGs	
	CABG with Cath.		CABG without Cath.		(n = 236)	
	(89.0%)		(11.0%)			
Surgeon	\$3,069	(1.00)	\$3,083	(1.00)	\$3,071	(1.00)
Assistant Surgeon	608	(1.00)	577	(1.00)	604	(1.00)
Anesthesiologist	488	(1.00)	512	(1.00)	491	(1.00)
Left Heart or Combined Cardiac Catheterization #1	483	(0.87)	--		483	(0.77)
Left Heart or Combined Cardiac Catheterization #2	395	(0.02)	--		395	(0.02)
Right Heart Catheterization	150	(0.73)	--		150	(0.65)
Other Cardiac Surgery	418	(0.08)	597	(0.12)	447	(0.08)
Vascular Injection Procedures	84	(0.49)	398	(0.54)	122	(0.50)
Non-Cardiac Surgery	488	(0.01)	--		488	(0.01)
Routine Hospital Visits	188	(0.88)	188	(0.73)	188	(0.86)
Concurrent Care Visits	111	(0.24)	160	(0.12)	114	(0.22)
ICU Visits	208	(0.66)	151	(0.23)	205	(0.61)
Consultations	77	(0.33)	69	(0.50)	76	(0.35)
Angiography and Other Cardiac X-rays	65	(0.13)	145	(0.08)	70	(0.13)
Cardiac Nuclear Imaging	42	(0.07)	--		42	(0.06)
Other X-rays	70	(0.90)	139	(0.81)	77	(0.89)
ECGs	43	(0.95)	51	(0.88)	44	(0.94)
Cardiovascular Stress Tests	31	(0.11)	48	(0.19)	34	(0.12)
Echocardiography	46	(0.07)	--		46	(0.06)
Other Cardiovascular Tests	42	(0.12)	14	(0.08)	40	(0.11)
Other Services	243	(0.31)	385	(0.42)	264	(0.32)
Total Package Price	\$5,338		\$5,023		\$5,303	
Coefficient of Variation	14.5%		19.8%		15.2%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each service is in parentheses.

Source: South Carolina 1981 Medicare Part B Claims Data.



TABLE B 9-3

INPATIENT CONDITION PACKAGES FOR INGUINAL HERNIA REPAIR WITHOUT OTHER MAJOR SURGERY AND ALL CASES<sup>a</sup>

	Hernia Repair Without Other Major Surgery (n = 740)		All Hernia Repair Admissions (n = 807)	
Surgeon	\$ 385	(1.00)	\$ 382	(1.00)
Assistant Surgeon	76	(0.06)	75	(0.06)
Anesthesiologist	76	(1.00)	75	(1.00)
Other Surgery <sup>b</sup>	110	(0.14)	263	(0.23)
Routine Hospital Visits	102	(0.12)	106	(0.12)
Concurrent Care Visits	71	(0.03)	77	(0.03)
Consultations	49	(0.16)	49	(0.17)
X-rays	27	(0.61)	28	(0.62)
ECGs	9	(0.75)	9	(0.76)
Lab Tests	24	(0.05)	28	(0.05)
Other Services	84	(0.05)	82	(0.05)
-----				
Total Package Price	\$ 531		\$ 572	
Coefficient of Variation	30.0%		43.2%	

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each service is in parentheses.

<sup>b</sup>Includes surgeon's, assistant surgeon's, and anesthesiologist's fees.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 9-4

INPATIENT CONDITION PACKAGES FOR PROSTATECTOMY<sup>a</sup>

	Suprapubic Prostatectomy (60.3%)	Other Prostatectomy <sup>b</sup> (39.7%)	All Cases <sup>c</sup> (n = 131)
Surgeon	\$793 (1.00)	\$1,032 (1.00)	\$888 (1.00)
Assistant Surgeon	160 (0.44)	200 (0.63)	179 (0.52)
Anesthesiologist	160 (1.00)	190 (1.00)	172 (1.00)
Other Urinary Surgery	194 (0.66)	241 (0.44)	213 (0.57)
All Other Surgery	225 (0.09)	594 (0.23)	373 (0.15)
Routine Hospital Visits	164 (0.34)	157 (0.33)	161 (0.34)
Concurrent Care Visits	100 (0.10)	114 (0.08)	105 (0.09)
ICU Visits	184 (0.03)	75 (0.02)	148 (0.02)
Consultations	53 (0.35)	51 (0.42)	52 (0.38)
X-Rays	44 (0.66)	72 (0.50)	55 (0.56)
ECGs	11 (0.71)	10 (0.85)	11 (0.77)
Lab Tests	--	78 (0.02)	78 (0.01)
Other services	46 (0.06)	17 (0.08)	34 (0.07)
Total Package	\$1,307	\$1,720	\$1,422
Coefficient of Variation	25.1%	33.0%	29.4%

<sup>a</sup>All dollars are Medicare reasonable charges. Relative frequency of each physician service is in parentheses.

<sup>b</sup>Includes perineal and retropubic procedures.

<sup>c</sup>Ten cases with a second major operation are included. Excluding them had no effect on intra-package variation.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 9-5

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR PNEUMONIA

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	321.51
Patient Age is 70+	-24.27**	-37.29***	-29.30***	-5.91
Patient is Female	-20.28*	-23.59***	-11.62	7.50
Specialty of Attending Physician <sup>a</sup> :				
GP-DO	18.83	15.78	16.01	-1.60
General Surgeon	8.19	-4.99	-7.55	11.55
Internist	93.43***	84.93***	76.24***	31.70***
Cardiologist	117.58***	123.42***	91.17***	49.84***
Pulmonary Disease Specialist	275.74***	280.91***	238.03***	53.70**
Other Specialist	23.23	49.37	29.86	17.78
Multi-Specialty Group	114.99***	104.97***	106.59***	44.71***
No. of Visits by Attending Physician	--	26.31***	23.19***	16.09***
No. of Visits by Other Physicians:				
Internists and Medical Specialists	--	--	17.87***	7.70***
Surgeons	--	--	21.51***	10.42***
GPs	--	--	16.70***	6.94***
Other Specialists	--	--	10.39***	5.87***
Patient Admitted Through ER	--	--	--	3.70
Patient Had Surgery <sup>b</sup>	--	--	--	298.29***
Patient in ICU	--	--	--	159.03***
No. of Chest X-Rays	--	--	--	26.15***
No. of Lung Studies	--	--	--	57.69***
No. of Other X-Pays	--	--	--	39.04***
No. of ECGs	--	--	--	32.74***
CONSTANT	291.66***	65.51***	53.73***	-2.80
R <sup>2</sup>	0.02	0.43	0.56	0.82
(df)	(9,5325)	(10,5324)	(14,5320)	(21,5313)
F	12.08***	402.46***	476.98***	1115.51***

<sup>a</sup>GP-MDs are in intercept.

<sup>b</sup>Minor and diagnostic surgery only, e.g., bronchoscopy, thoracentesis, etc.

\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 9-6

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR LENS EXTRACTION

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	1,656.72
Specialty of Surgeon <sup>a</sup> :				
DO Ophthalmologist	95.72***	88.05**	98.96***	0.07
MD (Not Ophthalmologist)	-42.88*	22.66	-2.83	
Type of Operation <sup>b</sup> :				
Intra- or extracapsular with iridectomy	--	37.52**	-13.84	0.20
Phacofragmentation	--	33.10	90.16***	0.01
Includes Prosthesis	--	754.85***	763.61***	0.68
Assistant Surgeon Used	--	--	403.75***	0.28
Patient has Two Unilateral Extractions	--	--	793.28***	0.03
Patient has Second Eye Operation	--	--	490.76***	0.11
Patient has Non-Eye Surgery	--	--	452.11***	0.02
No. of Routine Hospital Visits	--	--	28.08***	0.68
No. of Consults	--	--	108.72***	0.22
No. of X-Rays	--	--	18.37***	0.41
CONSTANT	1652.64***	1126.06***	881.45***	--
R <sup>2</sup>	0.002	0.38	0.70	
(df)	(2,10121)	(5,10118)	(12,10111)	
F	11.73***	1259.44***	1928.85***	

<sup>a</sup>Ophthalmologist MD is in intercept.

<sup>b</sup>Intra- or extrapsular extraction (without iridectomy) is in intercept.

\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: Michigan 1981 Medicare Part B Claims Data.

TABLE B 9-7

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR LEFT HEART CATHETERIZATION

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	824.64
Specialty of MD Performing Cath <sup>a</sup> :				
Cardiologist	-44.70	57.19	-0.45	0.65
Internist	-218.94***	-63.40	-21.17	0.19
Type of Cath <sup>b</sup> :				
Combined right and left heart with angiography	--	243.33**	257.26***	0.34
Left heart with angiography	--	5.70	116.90	0.63
Patient Has Second Left Heart Cath.	--	270.83*	218.91*	0.02
Patient Has Right Heart Cath.	--	709.54***	587.28***	0.02
No. of Routine Hospital Visits	--	--	27.87***	6.45
No. of Concurrent Care Visits	--	--	59.76***	0.34
No. of Consults	--	--	16.24	0.32
Patient in ICU	--	--	100.26**	0.22
No. of Catheterization X-Rays	--	--	137.60**	0.13
Cardiac Nuclear Imaging	--	--	86.09	0.07
No. of Other X-Rays	--	--	36.56***	1.78
Echocardiography	--	--	114.11**	0.12
No. of Routine ECGs	--	--	6.61	1.84
No. of Stress Tests	--	--	20.14	0.13
CONSTANT	896.11***	688.24***	305.58***	--
R <sup>2</sup>	0.02	0.14	0.48	
(df)	(2,519)	(6,515)	(16,505)	
F	5.85***	13.45***	28.65***	

<sup>a</sup>Multi-specialty group physician is in intercept.

<sup>b</sup>Left heart and combined right and left heart catheterizations without angiography are in intercept.

\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

TABLE B 9-8

## EXPLAINING VARIATION IN PHYSICIAN CHARGES FOR PACEMAKER INSERTION

	Regressions			Means
	(1)	(2)	(3)	
Total Package Price	--	--	--	1,034.79
Specialty of Surgeon <sup>a</sup> :				
Thoracic Surgeon	-19.78	-26.12	3.93	0.25
Cardiologist	106.57**	89.64**	46.28**	0.11
Other MD (not general surgeon)	-294.73***	-282.31***	-131.71***	0.05
Patient Has Temporary Pacemaker	--	495.84***	309.50***	0.11
Pacemaker Repaired	--	328.21**	287.27***	0.02
Anesthesiologist Used	--	--	150.12***	0.28
Patient Had Second (minor) Operation	--	--	202.40***	0.07
No. of Routine Hospital Visits	--	--	16.96***	7.09
No. of Concurrent Care Visits	--	--	16.05***	0.28
No. of Consultations	--	--	52.27***	0.31
Patient in ICU	--	--	119.58***	0.32
Patient Had Cardiac Cath.	--	--	416.54***	0.04
No. of ECGs	--	--	5.37***	2.64
No. of Other Cardiac Tests	--	--	59.38***	0.45
No. of X-Rays	--	--	21.70***	2.80
CONSTANT	1043.09***	985.60***	643.77***	--
R <sup>2</sup>	0.04	0.24	0.80	
(df)	(3,645)	(5,643)	(15,633)	
F	10.01***	41.43***	168.39***	

<sup>a</sup>General surgeon is in intercept.

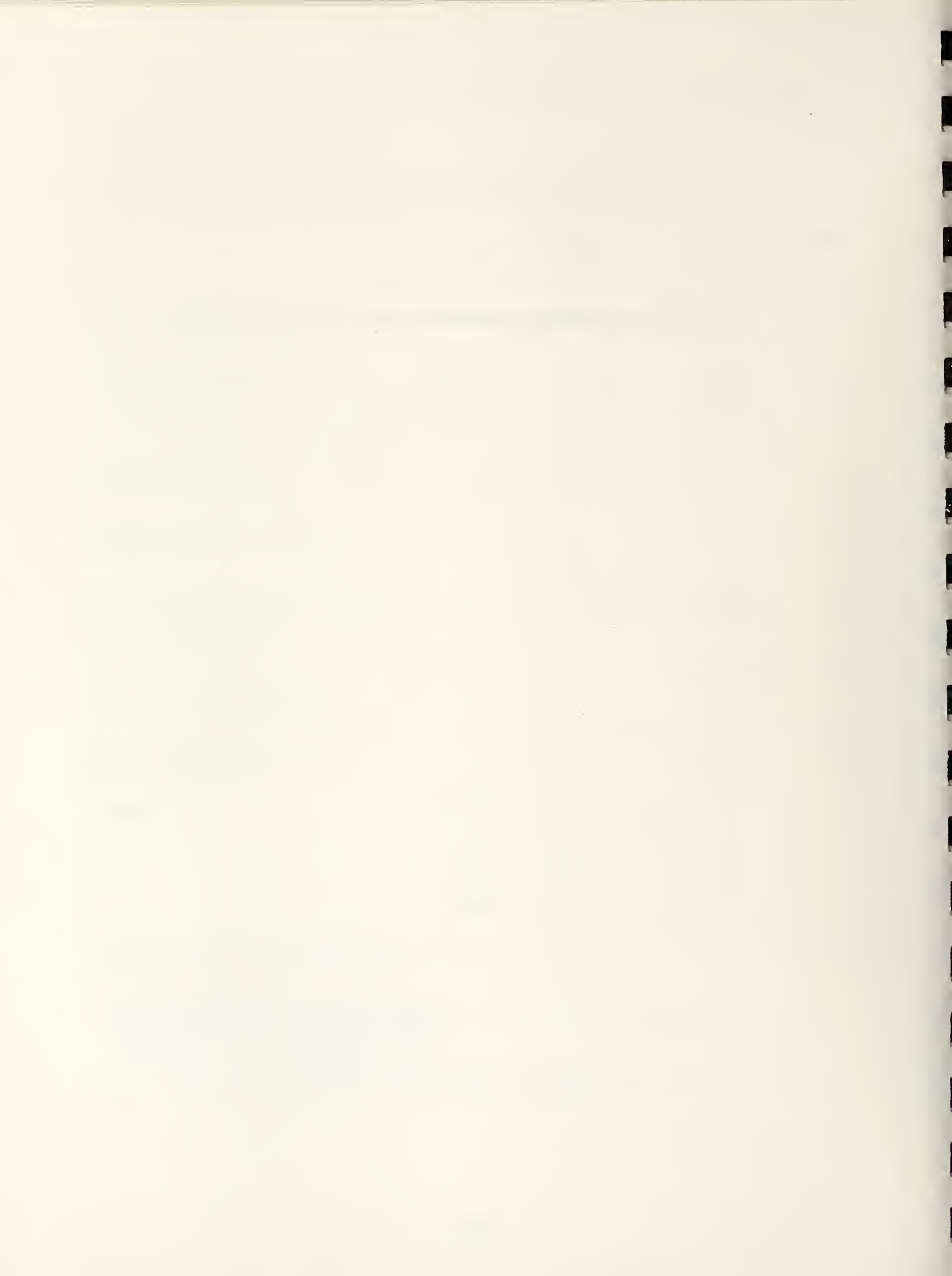
\*\*\*Significant at one percent level.

\*\*Significant at five percent level.

\*Significant at ten percent level.

Source: South Carolina 1981 Medicare Part B Claims Data.

APPENDIX C: GLOSSARY OF DIAGNOSTIC AND SURGICAL PROCEDURES





#### ARTHROCENTESIS OF A MAJOR JOINT:

Description: This procedure may be performed on an ambulatory basis or during a hospitalization. The skin is anesthetized and a needle is inserted into a joint space of a knee, elbow, or shoulder. Fluid is removed and sent for a series of chemistry tests, cultures, and tests specific to joint fluid.

Indications: When symptoms of arthritis are present with swelling and pain in the joint. Infectious arthritis, rheumatoid arthritis, gout, traumatic arthritis, osteoarthritis all are candidate diagnoses.

Time Window: Should include any x-rays of the joint taken prior to or following the procedure and any cultures and laboratory examinations performed on the joint fluid.

#### BRONCHOSCOPY:

Description: A flexible or rigid tube is inserted through the mouth into the bronchus of the lungs with the purpose of visually examining the lining of the bronchus and obtaining samples of fluid for culture or cytology (examination for abnormal cells).

Indications: Bronchoscopy is usually done in patients with pulmonary symptoms or findings on chest x-ray, the etiology of which is not clear. Lung cancer, tuberculosis, and other chronic lung infections are the primary conditions one is looking for.

Time Window: The day of the procedure and the 2-3 days thereafter, during which complications, if any, will manifest and laboratory results will be returned. Occasionally, cultures and cytology examinations may take much longer (2-3 weeks).

#### CARDIAC CATHETERIZATION:

Description: Cardiac catheterization involves threading a tube (or tubes) through an artery and/or vein in the leg or arm into the heart to measure pressures, sample blood in various locations and to inject radiographic dye. The purpose is to measure the functional capacity of the heart and to identify specific abnormalities of the valves or heart muscle. About three quarters of cardiac catheterizations involve coronary arteriography. In this latter procedure a special catheter is threaded into each coronary artery, dye injected, and radiographs are taken to identify areas of narrowing or obstruction of the coronary arteries. Left ventriculography is performed by injecting radiographic dye into the left ventricle and taking sequential pictures of the heart as it contracts. These radiographs then can be used to

identify abnormal areas of contraction in the left ventricle (main pumping chamber of the heart).

Indications: Cardiac catheterization is performed when either coronary artery or valvular disease of the heart is suspected, most commonly in anticipation of possible cardiac surgery. Most cardiac catheterizations are performed electively; however, perhaps 10% are performed under duress when the patient's condition deteriorates.

Time Window: For elective procedures, when the hospital admission is scheduled for an elective catheterization, the entire hospital stay would be included. When other reasons for hospitalization are evident the package needs to be more narrowly defined. This is specifically true when surgery follows on the same admission.

Related Procedures: Related procedures might include electrocardiography, cardiac radionuclide studies, exercise stress tests, serum chemistries and blood gasses, and all radiographs involving the chest and heart. Occasionally, dye dilution curves and serum lactates may be performed.

#### CHOLECYSTECTOMY:

Description: Cholecystectomy involves removal of the gall bladder with or without exploration of the duct leading from the gall bladder into the small intestine (common bile duct). Occasionally, bypassing procedures are required if the common duct is obstructed, for example, by cancer. Likewise, if the gall bladder is acutely inflamed, a drainage procedure may be done as a temporizing maneuver before the gall bladder is removed.

Indications: The most common indication is cholelithiasis or gallstones which lead to recurrent or chronic cholecystitis (inflammation of the gall bladder). A more radical procedure may be required if cancer of the gall bladder or its adjacent structures is identified.

Time Window: It would be reasonable to include the preoperative workup including all associated gall bladder studies (oral or intravenous cholecystogram, ultrasound). These might occur anytime in the month or two preceding elective surgery. Following surgery, only complications that occur should be included as well as x-rays, blood tests and cultures. The package should extend at least through the first post-discharge office visit.

### COLONOSCOPY:

Description: A flexible fiberoptic scope is inserted through the rectum. The instrument can be threaded up the large intestine and even across into the small intestine. The wall of the intestine is examined, biopsies taken and samples of stool obtained.

Indications: Indications usually relate to a change in bowel habits (constipation and diarrhea), bleeding or pain on defecation. Conditions sought include cancer of the sigmoid colon or rectum, ulcerative colitis and polyps.

Time Window: A barium enema or colonoscopy may precede or follow the procedure. Any test results (chemical, bacteriological or pathological) should be available within one week.

### CORONARY ARTERY BYPASS GRAFT (CABG):

Description: Areas of obstruction in the coronary arteries are bypassed either by taking a piece of vein from elsewhere in the body or by using the internal mammary artery (an artery near the heart) to bypass the obstruction. One, two or more (up to 7 or 8) bypass grafts may be inserted in any one patient.

Indications: Severe anginal pain unrelieved by medications or certain configurations of coronary artery disease (left main disease or three vessel disease) that have been shown to have better survival with surgery than with medical treatment.

Time Window: At a minimum, the hospitalization during which the surgery is performed including any preoperative workup and post-operative care. A broader package would also include the diagnostic evaluation (coronary arteriography and possibly other tests) used to establish a "baseline" for monitoring the post-operative course of the patient.

### CYSTOURETHROSCOPY:

Description: A tube is inserted through the urethra into the bladder. Also fiberoptic scopes can be inserted and threaded into the ureters or up into the kidneys. Urine samples and biopsies can be obtained from various points in the urinary tract.

Indications: Usually performed for symptoms such as difficulty voiding, hematuria (blood in the urine), stones, recurrent infections, or because of possible obstruction of the urinary tract, either at the ureter or at the

outlet of the bladder. Kidney stones, cancer, and abnormalities of the muscular function of the bladder are the most common underlying problems.

Time Window: Frequently the procedure is preceded by an intravenous pyelogram (IVP). (This may not be a consistent enough feature, however, to constitute a package element.) Following the procedure, all test results (urine flow rates, urine cultures, urinalyses, pathological examinations) should be reported within 7 days.

#### INGUINAL HERNIORRAPHY (HERNIA REPAIR):

Description: An inguinal hernia is a bulging of abdominal contents through a weakness in the abdominal wall in the inguinal (groin) region. A herniorraphy merely repairs this area of weakness to prevent the herniation.

Indications: The risk of a hernia is that it may become incarcerated (stuck) or strangulated (necrotic). So long as the hernia is free sliding, there is room for debate whether supportive procedures such as trusses are a reasonable alternative to surgery.

Time Window: The hospitalization during which herniorraphy is performed, including the post-operative period and any complications that occur during it.

#### LENS EXTRACTION PROCEDURES:

Description: Three basic approaches are used to remove a lens cataract that obscures vision. In the intra-capsular approach, the cataract is removed but the lens is left intact; in the extra-capsular approach, the entire lens including the capsule is removed; also a variety of procedures are available whereby the lens is dissolved through ultrasonic treatment or other means and the semi-liquid material remaining is removed by suction.

Indications: Cataract with important obstruction of vision.

Time Window: Hospitalization during which the procedure is performed. One might, however, also want to include diagnostic workup that preceded admission and subsequent evaluation of vision and fitting of glasses, contact lenses, or lens replacement.

#### PERMANENT TRANSVENOUS PACEMAKER INSERTION:

Description: The pacemaker's wire is usually inserted through one of the large veins in the neck into the right ventricle where it is lodged in the wall of the heart. A battery that provides the electrical impulse to a pacemaker is placed under the skin of the chest wall. The entire procedure can be done under local anesthesia.

Complications include infection at the time of insertion, breakage of the pacemaker wire, malfunction of the battery, and (occasionally) "failure to pace" without evidence of malfunction of any components. Battery life now is four to five years.

Indications: The most common indication is complete heart block, that is, when electrical impulses are "blocked" and cannot stimulate the heart to beat in a normal manner. The result may be either too slow a heart rate or actual stopping of the heart with resultant syncope. Sometimes a pacemaker is inserted to "overdrive" a rapid heartbeat, however.

Time Window: The insertion of a permanent transvenous pacemaker could be considered a discrete procedure. This would involve only the day that the pacemaker is inserted and perhaps up to a week thereafter, during which complications such as infection or displacement of the pacemaker wire, might be encountered. Alternatively, one might think of a package that would include the guarantee of effective pacemaker function for periods of one, two, three, or even five years.

#### PROCTOSIGMOIDOSCOPY:

Description: Like colonoscopy, except that a second rigid instrument is inserted that permits better visualization of the rectum (first 3 to 4 inches of the large intestine). Hence the procedure is slightly more time consuming.

Indications and time window are similar to those for colonoscopy.

#### PROSTATECTOMY (SUPRAPUBIC):

Description: During this procedure the prostate is removed through a incision in the abdomen.

Indications: Some urologists feel strongly that this procedure is the preferred treatment for benign prostatic hypertrophy. More radical types of prostatectomy are used to remove the cancer of the prostate.

Time Window: Could include only the hospitalization during which the procedure is performed or could also include the pre-operative workup which frequently includes a cystourethroscopy, prostatic biopsy, IVP, and blood chemistry tests. These tests may be done in the office and generally would be done within a month of the procedure. Following the operation, bleeding (if any) would be expected in the first few days but stricture of the urethra could occur at any time up to several months afterwards.

#### SIGMOIDOSCOPY:

Description: A rigid tube is inserted through the anus to visualize the lining of the rectum and lowest part of the large intestine. Stool samples may be taken and a biopsy is frequently performed.

Indications and time window are similar to those for colonoscopy.

#### TOTAL HIP REPLACEMENT OR HIP RECONSTRUCTION:

Description: Total hip replacement involves the removal of both the head of the femur and the hip joint and insertion of a complete hip prosthesis. Hip reconstruction maneuvers vary but involve repair/replacement of either the head of the femur or hip joint but not replacement of both.

Indications: Severe arthritis of the hip which either immobilizes the joint or causes severe pain.

Time Window: Hospitalization during which procedure is performed including post-operative care and any physiotherapy provided to facilitate rehabilitation. The latter may extend into the post-discharge period.

#### TRANSURETHRAL RESECTION OF THE PROSTATE GLAND (TURP):

Description: The prostate gland is removed by curretting it through the penis. Major risks are bleeding and subsequent stricture of the urethra.

Indications: Prostatectomy is required when the urethra (outflow from the bladder) is obstructed due to enlargement of the prostate gland. Before doing a TURP, it is important to rule out cancer and, hence, to be certain one is dealing with benign prostatic hypertrophy.

Time Window: Similar to prostatectomy (suprapubic).

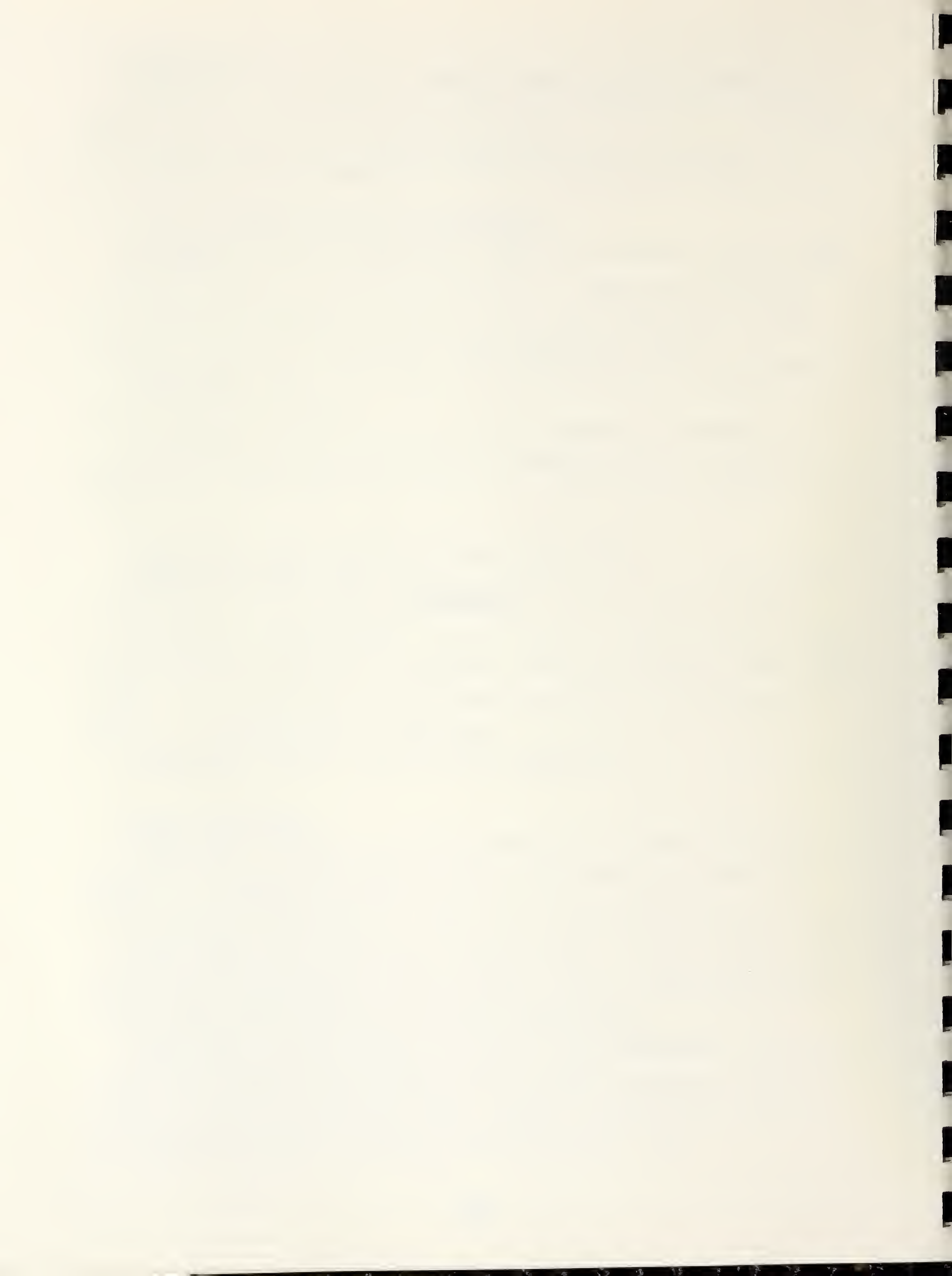
#### UPPER GI ENDOSCOPY:

Description: A flexible tube (fiberoptic) is inserted through the mouth into the stomach and upper intestine. The lining of the stomach and intestine is visualized and fluid samples and biopsies obtained.

Indications: The procedure is done when symptoms suggest disease of the stomach and intestines, hematemesis (vomiting blood), or pain or weight loss are the most common symptoms; the most common associated diagnoses are peptic ulcer disease, cancer or sprue (intestinal malabsorption).

Time Window: Usually an upper GI series is done beforehand. In fact, the findings on an upper GI series may be the indication for doing an endoscopy. Chemical analyses of the gastric fluid, cytology or pathological examination of biopsies may be done and should be available within a week.

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