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PACKAGING OUTPATIENT PHYSICIAN SERVICES

Final Report

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

EXECUTIVE SUMMARY

This study gives renewed attention to developing and evaluating innovative alternatives for packaging outpatient services on a multiple-visit basis. Our purpose is not so much to develop a comprehensive framework for condition-based packaging as it is to demonstrate the merit of pursuing additional developmental work in this area. We anticipate that significant investments will be required to fully elaborate and evaluate episode-based alternatives for packaging. However, until a presumptive case can be made -- as we have sought to do -- that such investments may eventually "pay off," the investments will not be made.

We put forward and test four methodologically-different approaches to packaging episodes of care. The four condition-related outpatient packages are: (1) laser eye surgery, (2) podiatric services, (3) cardiac testing, and (4) cancer treatment. In selecting these package models, we sought to distinguish practical alternatives for specifying episodes of care without the benefit of outpatient diagnoses. Our choice of packages was guided by their clinical integrity as well as cost-saving potential and feasibility of implementation.

We use actual payment data to simulate the four package models. For each of the four models, we simulate the distributional consequences of paying providers on an all-inclusive, single fee basis. We then consider whether or not the projected distributional impacts are reasonably equitable and have sufficient potential to warrant the continued development and testing of outpatient package payment arrangements.

We use CHER's Multistate Data in developing and simulating the impacts of packaging alternatives. As part of various HCFA-funded projects, CHER has obtained all (i.e., 100 percent) Part B claims for eleven states, 1985 through 1989. These claims were obtained directly from the carriers and converted to a standardized, user-friendly format. However, in order to avoid excessive computational expense, we conducted this work using 1988 data from five states only. As in other projects, we identified the following states in constituting a geographically representative sample: Arizona, Connecticut, Georgia, Kansas (including that portion of the Kansas City MSA in Missouri), and Washington. This sample gives us one state from the Northeast, one from the Southeast, one from the Midwest, one from the Southwest, and one from the

Northwest. For two of the four package models, we also used 1987 and 1988 hospital stay data to distinguish, on a proxy basis, the package-eligible cohort and provide a diagnostic baseline.

We conclude that at least two of the four package models--podiatric services and cancer treatment--have significant potential for future demonstration projects or program implementation. Although the laser eye surgery package also has significant potential, we nevertheless suggest that another alternative for bundling those services is more attractive. Only cardiac testing may have little or no potential for packaged payment.

While encouraging, our results are nevertheless inadequate to support their application to practical payment arrangements. Without further research and development, we cannot recommend any program adjustments or demonstration initiatives. Our methodology, and results, were significantly shaped and constrained by the lack of diagnostic coding in Medicare's outpatient claims data. Now that diagnostic coding has become available, it becomes imperative to refine and extend our work using these more reliable data. Indeed, we do not believe that any of our package models would be credible without the facility to positively identify those services provided for a given condition or diagnosis. Also, additional developmental work on the staging or categorization of patient severity needs to be done.

We believe that the study provides analytic support for both the feasibility and desirability of episode-based packaging. With podiatric services and cancer treatment, in particular, comparatively large numbers of services are being billed for each patient, and geographic practice variation is significant. The administrative cost savings alone could make packaged payment worthwhile. For example, rather than paying ten or more bills per month for cancer treatment, Medicare might pay a single capitation amount--and thereby also give incentive to the physician-in-charge to coordinate cancer treatment on a cost effective basis. Whereas our simulation findings indicated a high and probably unacceptable level of provider risk for such arrangements, we anticipate that the risk can be reduced to an acceptable level by incorporating patient severity adjustments as appropriate.

Given our experience with the four package models, we doubt that a more systematic or comprehensive approach to condition-specific packaging can be found. Each of the four models involved unique package definitions, confronted different practice environments, and presented altogether different payment concerns.

We don't anticipate that--other than primary care capitation--it will ever be feasible (or desirable) to develop multiple-visit packaged-based payment arrangments for all or even most outpatient services. Rather, we recommend that outpatient packaging be done on an opportunistic basis, for only a selected subset of conditions and specialties. Furthermore, based on our experience, we anticipate that each package will require customized development, giving focused attention to the clinical and practice dimensions of the condition involved.

We summarize our findings and conclusions relative to the four package models as follows.

Laser Eye Surgery

There is unquestionably significant potential for package-based payment of laser eye surgery and related services provided to after-cataract patients. The dispersion of gains and losses across providers is not unreasonably high, and the disparities within provider group, especially the high volume providers, are comparatively moderate.

On balance, however, we believe that the most promising alternative would be to bundle after-cataract treatment with the cataract procedure itself. Although we did not explicitly investigate that prospect, it is conceptually more attractive than the one that we examined. In particular, bundling after-cataract treatment with the cataract procedure would help to avoid concerns about the inherent ambiguity of clinical thresholds for treatment of cataract sequelae. That decision would then be internalized by the provider.

We also concluded that there was little opportunity for bundling laser eye surgery to diabetic retinopathy patients, due to low patient volume and comparatively large within-group variability.

Podiatric Services

For high volume providers, at minimum, we conclude that podiatric services offer reasonable promise for packaged payment. While practice variability is still important, even for providers with 500 or more patients, it seem unlikely that the practice differences could be

attributed only to systematic differences in patient need. Furthermore, given the discretionary and non-critical nature of most podiatric care, podiatric services would seem to be a good candidate for testing whether or not bundled payment leads to more consistent and more appropriate patterns of care.

The regional disparities in podiatric practice patterns require further investigation. In particular, we recommend that HCFA examine the practice differences and evaluate whether podiatric practice is more or less appropriate in those areas which provide more services. Such a study would probably require review of medical records in addition to claims analysis. Once practice standards have been set, a state-specific payment system could be transitioned to a national-average payment system--namely, one which reflects the appropriate level of service intensity.

Our patient taxonomy (i.e., subdividing patients into foot, nail and nonprocedure cohorts) is admittedly ad hoc. It nevertheless seems to work quite well. We do not, however, wish to preclude alternative approaches to patient stratification; and, indeed, we encourage HCFA to develop and investigate other alternatives. It would be preferable to have a diagnostic- based payment scheme that providers could accept as being clinically meaningful.

Cardiac Testing

Although the cardiac testing results are not altogether unsatisfactory, we do not believe there is significant potential for reimbursement of cardiac testing on a packaged basis. The variability in clinical practice is clearly significant. However, unlike cancer treatment, we see no real opportunities for improving the risk performance with respect to cardiac testing. Even if diagnostic information were available, we doubt that it would be useful for risk adjustment purposes--or, for that matter, that risk adjustment would make much difference.

The problem here seems to be one of inherent variability in the intensity of testing. Before going forward with bundled payment in this area, one must first have a better understanding of the clinical context, including the appropriate indications for and use of cardiac testing. As it is now, we do not know whether providers are doing too much or too little--and, unlike podiatric services, cardiac testing involves potential "life and death" considerations which cannot (or should not) be resolved through a demonstration test.

We recommend that HCFA investigate the availability and applicability of clinical practice guidelines for cardiac testing. Once appropriate guidelines have been identified or developed, they should be evaluated relative to their potential for supporting a packaged payment arrangement. If appropriate, updated simulation analyses would then be conducted, examining the distributional impacts of alternative package and payment definitions.

Cancer Treatment

The results for our cancer treatment model, as we have defined it, are not encouraging. The level of risk implied, even for providers with larger patient panels, is probably unacceptable and potentially inequitable. Our diagnostic classification of cancer types is simply not adequate to control for the underlying differences in patient treatment requirements.

The basic concept of capitating cancer treatment nevertheless remains attractive and promising--and we recommend that the prospect receive further attention. In particular, we recommend that HCFA use diagnostically-coded claims data to conduct a more focused study on the epidemiology and natural history of cancer treatment. This study should identify cancer patients at time of first diagnosis and then follow their utilization and costs for several years.

We further recommend that HCFA investigate the feasibility of using the National Cancer Institute's cancer staging methodology for risk-adjusting package payment rates. Cancer stage, however, is not currently included in the ICD-9-CM diagnostic coding structure. Thus, a study of this type would probably require reference to medical records.

This study makes no attempt to project the cost savings associated with packaging. Indeed, we believe that it would have been premature to do develop such estimates. Although better data will unquestionably help, we nevertheless question whether the cost savings potential of packaged payment can be reliably determined apart from some kind of market or demonstration test. It would have been extremely difficult, for example, to gauge the value of capitating primary care physicians if no one had ever done it before. We simply don't understand either physician behavior or clinical practice well enough to anticipate the utilization and cost impacts.

1.0 INTRODUCTION AND BACKGROUND

Beginning with the 1984-1986 physician fee freeze and continuing with modest MEI updates, or even fee reductions in the case of overpriced procedures, Medicare has exerted strict control over the rates of increase in Part B payments on a per service basis. Nevertheless, Part B expenditures have continued to increase at double-digit rates (Helbing et al., 1991). The major factor behind this expenditure growth has been increased volume or service intensity. Patients are receiving more services and more complex services than ever before.

In order to effectively control costs in the future, policymakers must control both prices and volumes. The current approach is to employ very different tools for the two purposes. The Medicare Fee Schedule is intended to limit prices while the Medicare Volume Performance Standards are intended to control volume. If feasible, a preferred alternative would be to develop payment approaches that simultaneously control both prices and volumes. How might this be done? One promising approach, the one which we explore, is to package or bundle physician services. Rather than paying for narrowly-defined procedures, payment is made for a more comprehensive bundle of services related to a specific patient need.

The major advantage of such packaging is that it motivates physicians to take a more cost-conscious approach to patient care, giving significant incentive both to reduce or eliminate unnecessary services and also to provide necessary services at lower cost. Under the current system, the physician benefits financially in ordering diagnostic tests whenever he or she also provides those tests, or has an equity position in whoever does. Even when ordering tests from other physicians with whom he or she has no financial relationship, the physician benefits from the added clinical information without taking any account of the costs.

The current HCPCS procedure coding system includes over 8,000 codes describing physician services. The challenge is deciding how to reasonably package or combine those services for payment purposes. A decade ago, researchers at the Center for Health Economics Research (CHER) developed a typology of packaging methods and evaluated a number of specific alternatives using claims data (Mitchell et al., 1983; Mitchell et al., 1987). These

alternatives included office visit and surgical procedure packages as well as more comprehensive condition and beneficiary-based packages. At that time, the lack of adequate ambulatory case-mix measures proved to be a major obstacle in packaging payments for office visits and related ancillaries. Three different approaches to casemix adjustment were investigated: (1) diagnosis/visit type (ICD-9 codes stratified by new versus established patient); (2) reason for visit (e.g., return visit for treatment of new symptoms); and (3) ambulatory patient-related groups (APGs), an early forerunner of the current classification system by the same name.* None of these were successful in explaining the variation in inputs associated with a given office visit package.

In this study, we give renewed attention to developing and evaluating innovative alternatives for packaging outpatient services on a multiple-visit basis. Our purpose is not so much to develop a comprehensive framework for condition-based packaging as it is to demonstrate the merit of pursuing additional developmental work in this area.

The report is organized as follows. Section 2.0 presents the study's research approach including study objectives, the analytic strategy, data and data development, and the strengths and limitations of our work. Section 3.0 presents a simplified conceptual framework for depicting different packaging practices. Section 4.0 defines four package models to be evaluated in this study: (1) laser eye surgery, (2) podiatry services, (3) cardiac testing, and (4) cancer treatment. It indicates the rationales for selecting these packages and describes our approach to case-mix adjustment. Basic information on the service composition of the packages is also presented. Section 5.0 simulates the redistributional effects by geographic area and various beneficiary characteristics (e.g., age and sex). It also simulates the redistributional effects on individual physician practices and considers the level of provider risk that would be involved. Section 6.0, finally, summarizes the study findings and indicates their implications for subsequent research and policy development.

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*This early comparison of ambulatory case-mix measures was accomplished using data from two carriers that, at that time, already included physician-reported diagnoses in their automated claims.

2.0 RESEARCH APPROACH

2.1 Study Objectives

The main objective of this study is to further investigate multiple-visit alternatives for packaged reimbursement of outpatient physician services. In recent years, major procedure or visit-based packaging alternatives--e.g., Ambulatory Patient Groups (APGs), Ambulatory Visit Groups (AVGs), Products of Ambulatory Care (PAC) and Products of Ambulatory Surgery (PAS), and Ambulatory Surgery Center (ASC) categories--have received considerable attention (Averill, et al., 1990). By comparison, episode-based, multiple visit packaging alternatives have received comparatively little attention (Schneeweiss, et al., 1983).

This study gives renewed attention to multiple-visit or condition-based packaging. It is important, however, to establish that it is not the objective of this study to develop a unified methodology or system for episode-based packaging of all outpatient physician services. Indeed, it would be altogether premature to attempt so ambitious an objective, especially given the modest intellectual foundation and the inherent limitations of the data available (e.g., lack of diagnostic information) at the time our work went forward. Rather, our interests are more far-ranging and less focused, as indicated from the three specific objectives stated below.

The first objective is to develop and evaluate several innovative alternatives for multiple visit-based packaging. We put forward and test four methodologically-different approaches to packaging episodes of care. In so doing, we focus on clinical circumstances which could be reasonably packaged without the benefit of outpatient diagnostic information. Any of the four packaging alternatives examined in this study could be included in a potential reimbursement demonstration, and we indicate recommendations relative to such prospects.

A second objective is simply to demonstrate the feasibility of episode- type packaging. We want to establish the merit or potential of pursuing new developmental work in this area, whether or not our results are directly useable for either program or demonstration purposes. We anticipate that significant investments will be required to fully elaborate and evaluate episode-based alternatives for packaging. However, until a presumptive case can be

made -- as we have sought to do -- that such investments may eventually "pay off," the investments will not be made.

A third objective is to develop methods and suggest directions for subsequent developmental work in this area. Based upon our exploratory analyses, we recommend what we believe to be the most fruitful next steps in the more systematic investigation and development of multiple visit-based payment approaches. In proposing a strategy for longer-term development, we expressly consider the implications of having diagnostic information available from claims data. Indeed, we believe that any comprehensive approach to episode-type packaging depends importantly on the availability and validity of such information.

2.2 Analytic Strategy

Our challenge was to find **clinically meaningful** ways of bundling and paying for multiple visits, and related ancillaries, on a package basis **without imposing undue financial risk** on the providers. Furthermore, given the limitations of data available at the time, this needed to be done **without the benefit of outpatient diagnostic information**. This latter constraint severely narrowed the domain of possibilities and became a major consideration in choosing package models (i.e., defining the clinical episodes) to be included in this study.

Our general approach involved answering a sequence of three questions:

(1) Which patient conditions typically involve multiple-visit or multiple-procedure episodes of care?

(2) For which conditions, can a coherent bundle of services be reasonably defined or proxied from the available procedure and specialty information?

(3) Finally, for each package condition, would package payment assure reasonable equity and avoid undue financial risk to the providers?

The first question is answered rather informally, based on prior research, policy concerns and the researchers' collective familiarity with ambulatory care practice patterns. Inasmuch as it is not our intent to be comprehensive, a more systematic screening process was not considered necessary.

The second question is answered, in part, by heuristically considering how conceptually-appropriate definitions might be approximated or proxied without benefit of diagnostic information. It is also answered, in part, through detailed examination of payment histories and preliminary testing of alternative definitions.

The third question receives more formal and deliberate attention, and is the principal question addressed by this analysis. Having developed package specifications in response to question (2), we investigate a variety of alternative payment arrangements and simulate their potential redistributional effects on various patient cohorts (e.g., by age and sex group, urban versus rural, and state versus state). We likewise simulate the redistributional effects on individual physician practices.

Finally, in reviewing our simulation findings, we consider the feasibility and desirability of actually paying providers using our four package models. This end-stage review leads, in turn, to recommendations for pursuing more research and development.

Our analytic approach is broadly similar to that used by the Prospective Payment Assessment Commission (ProPAC) in many of its studies. In particular, ProPAC uses a combination of "clinical" and "statistical" analyses in a two-step process to identify and evaluate potential modifications to the Prospective Payment System. Clinicians first define or identify clinically-homogeneous groups of Medicare patients. ProPAC analysts then use claims data to evaluate the extent of cost homogeneity within these clinically-defined groups. This is done by calculating various statistical measures such as the coefficient of variation--much as we do herein. The major advantage of this sequential, first clinical and then statistical, approach is that it works to assure the development of payment groups which will be meaningful to the clinicians involved and yet meets other practical payment objectives.

2.3 Data Design

In structuring our approach to this project, we judged that it was essential to evaluate the effects on practice-specific risk--i.e., to determine which physician practices win and which ones lose, and to appraise the overall equity of such outcomes. This, however, meant that

sample data would not be adequate. In particular, the five-percent BMAD Beneficiary File does not give sufficient precision to assess the effects on individual practices; and the five-percent Provider File does not contain information on package services provided by other providers. A complete **census** of Medicare Part B claims data was required.

We therefore use CHER's Multistate Data in developing and simulating the impacts of packaging alternatives. As part of various HCFA-funded projects, CHER has obtained all (i.e., 100 percent) Part B claims for eleven states, 1985 through 1989. These claims were obtained directly from the carriers and converted to a standardized, user-friendly format. However, in order to avoid excessive computational expense, we conducted this work using 1988 data from **five** states only. As in other projects, we identified the following states in constituting a geographically representative sample:

- Arizona,
- Connecticut,
- Georgia,
- Kansas (including that portion of the Kansas City MSA in Missouri), and
- Washington.

This sample gives us one state from the Northeast, one from the Southeast, one from the Midwest, one from the Southwest, and one from the Northwest.

For two of the four package models, we also used 1987 and 1988 hospital stay data to distinguish, on a proxy basis, the package-eligible cohort and provide a diagnostic baseline. The requisite Part A claims data came from the Medicare Automated Data Retrieval System (MADRS).

In the past, package costs have been measured by the Medicare allowable reimbursement amounts, with or without adjustment for geographic price differences. However, with implementation of the Medicare fee schedule, the historic amounts allowed for reimbursement are no longer meaningful or relevant. Under the new Medicare fee schedule, implemented on January 1, 1992, Part B services are measured and paid on a Resource-Based Relative Value Scale (RBRVS) basis.

Given the timing of our work, it was not possible to examine experience under this new payment system. As an interim alternative, and only partial solution, we used "national

average prices" to weight service intensity and essentially eliminate variation related to reimbursement rate differences. The price-adjusted charges were calculated by assigning the national average Medicare-allowable (or covered) charge to each procedure code and modifier combination, using 1988 data.

Inasmuch as the same price weights were used in all geographic areas, the differences indicated from our study reflect only differences in the quantities of services provided -- albeit not in the same way as would be indicated from the Resource-Based Relative Value Scale. Our price-weighted comparisons should provide a more reliable guide than actual reimbursement-based comparisons; nevertheless, until our analyses can be replicated from experience with the new fee schedule, we will not know whether or not they are sufficiently dependable for policy purposes.

3.0 CONCEPTUAL DISCUSSION

The "ultimate" product being produced by health care providers is the health of the patient. An ideal payment system might pay a fixed amount for a given health outcome. The health care production process, however, is not so well understood that we know how to measure health outcomes or how much to pay for a given improvement in health status. As an alternative to paying for health outcomes, most health care providers are currently paid for the service input they provide to the production process. However, there is no assurance that the inputs provided actually improve health or that they are combined efficiently (i.e., at lowest cost) in producing health improvement. The current reimbursement system thus encourages over-utilization of inputs and does not in any way motivate the selection of lower cost but equally effective treatment alternatives.

The packaging or bundling of services basically involves aggregating inputs to higher levels of intermediate output. The proposed APG classification system, for example, aggregates certain inputs (e.g., ancillaries provided as part of a given visit) into a higher-level input. It is comparable to making the transition from paying for the iron ore to paying for steel when the desired output is a car. The APG system should encourage more efficient use of inputs in the production of that intermediate output, but it still does not link intermediate outputs directly to health outcomes.

Reimbursement based on an episode of illness more closely links payment to the desired health outcome. In the case of an episode, payment is based on treatment of the entire course of illness. The provider thus has the incentive to provide only the minimum level of services necessary to produce a given health outcome, whether that outcome is to repair damage, prevent further damage, eliminate an infection or alleviate symptoms. The current DRG-based system of hospital reimbursement can be considered a partial episode-based reimbursement system. However, it is not a full episode-based reimbursement system since it does not cover physician services, pre-admission and post-acute care related to the hospitalization. An episode-based reimbursement system is theoretically appealing but not always practical or feasible. The four packages analyzed in this report are, like the DRG payment system, best described as being partial episode-based approaches.

An additional alternative which links payment to health outcomes is capitation-based payment. A full capitation system pays providers a fixed amount for all health care services provided to an individual or family in a given period of time. A partial capitation system reimburses providers a fixed amount for a category of services provided to an individual or family -- e.g., all dental or all mental health services. In theory, capitation reimburses a provider for maintaining a given level of health. The provider has clear financial incentives to do this by using the least-cost combination of inputs. There are, however, two problems with capitation. The first is that individuals come to a provider with different levels of health status and thus require varying levels of services to produce a given health outcome. For example, if one of the desired health outcomes is to prevent heart attack or stroke, then a person with high blood pressure requires more services and costs more than a person without high blood pressure. A second problem with capitation is that providers are being paid for maintaining a given level of health, but there is strong financial incentive to provide fewer services and accept a lower level of health.

3.1 The Conceptual Context--Theoretic Choices Along the Packaging Continuum

The package models examined in this study involve aggregating or combining specific outpatient services currently being paid on an individual or **a la carte** basis into bundles of care which could be paid on a single-price or **prix fixe** basis. In this sense, they all involve movement to the right in Exhibit 3-1.

Exhibit 3-1 portrays the packaging dimension of health care payment alternatives--or, as we shall call it, the **packaging continuum**. As the legend for this figure indicates, movement to the left along the packaging continuum implies greater fragmentation (i.e., finer subdivision) of services for payment purposes, and movement to the right implies greater bundling (i.e., grouping together) of services. The relative positions of six basic types of health care packaging are indicated below the line in Exhibit 3-1. Beginning on the right-hand side of this figure (i.e., at the highest level of aggregation), we briefly consider what is meant by each of these general types:

Full Capitation. Large medical groups frequently contract with HMOs on a full capitation basis, wherein they are paid a fixed dollar amount per month (or per year) for all professional and institutional services. Less commonly, medical groups contract on a fully-capitated basis for **professional services only**. Inasmuch as we are focusing on professional services, the more restricted definition is appropriate here.

Partial Capitation. IPA-type HMOs routinely contract with primary care physicians on a partial capitation basis, wherein they are paid a fixed dollar amount per month (or per year) for certain, pre-specified professional services. On occasion, other specialties (e.g., mental health) are contracted and paid in this way.

Episode. Obstetric services are customarily paid on an episode-of-care basis, that is, including all professional services related to treatment of a specific condition (i.e., pregnancy). Global surgical fees also fall into this category.

Visit. In actual practice, few providers are paid on a pure visit basis, including all services provided as part of or in association with each visit. On an interim basis only, Community Health Centers (CHCs) are paid in this way; and some hospital outpatient departments still bill their visits on a per visit basis only (i.e., without additional billing for ancillaries).

Function. Some health care services are billed on a total function basis, namely, including **all** professional services and supplies related to performance of a discrete treatment or diagnostic test provided to the patient at a single point in time. For example, EKGs are generally billed on a full function basis (i.e., with a single bill for both the professional and technical components).

Functional Fraction. Much health care is actually paid on a "functional fraction" basis, meaning that patient care functions or services are broken down and billed on the basis of their multiple components (i. e., billing separately for the various inputs involved in providing a treatment or test). Consider two examples. The function or service provided to a patient is a single x-ray, but the professional and technical components are billed separately. Likewise, the patient receives a single surgery, but the surgeon, assistant surgeon and anesthesiologist are billed separately. These are functional fractions.

Our current CPT-based reimbursement system does not fall neatly into any of the above packaging categories. Indeed, as the above discussion suggests, it combines elements of the last four types--namely, (1) episode, (2) visit, (3) function and (4) functional fraction-based payment methodologies. We nevertheless suggest that the vast majority of Part B Medicare expense is billed on a functional fraction basis.

For heuristic purposes, our present CPT payment system can be located at point "A" in Exhibit 3-1, falling midway between the "functional fraction" and "function" categories. By

comparison, the newly-proposed Ambulatory Patient Group (APG) system is located at point "B," midway between the "function" and "visit" categories. The APG payment approach does not involve any functional fractions. Finally, the four package models put forward in Section 4.0 might be located at approximately point "C," which is midway between the "visit" and "episode" categories.

As portrayed in Exhibit 3-2(a), movement along the packaging continuum involves a fundamental tradeoff between provider equity and social efficiency, as discussed below. A high level of provider equity is assured as long as provider compensation varies directly with the level of work performed; and the more finely the work differences are measured, the greater is the presumptive level of equity. On the other hand, paying providers on the basis of work actually performed gives them incentive to perform more work and provide more services than may be necessary.

As we move towards the capitated, more highly bundled end of the continuum, the situation reverses. Under capitation, provider compensation varies only with patient volume. That is, the level of compensation for a given patient is altogether independent of the quantity of care actually provided, and significant inequity is possible. A capitated payment approach, however, also gives providers dramatic incentive to avoid unnecessary services and to provide needed services as inexpensively as possible. Thus, movement to the right along the packaging continuum involves a presumptive increase in the overall efficiency of health care delivery.

The equity-efficiency tradeoff is not, however, an immutable relationship. As depicted in Exhibit 3-2(b), the level of efficiency on the left-hand side of the continuum may be shifted up--e.g., through the development and application of practice guidelines and various utilization management programs. Analogously, the level of equity on the right-hand side of the continuum may be shifted up--e.g., through case-mix adjustment, risk pooling, outlier payments and other alternatives for risk-adjusting provider payments. Health services research and health system reform initiatives are now working to accomplish both objectives, namely, (1) shifting up the equity curve and (2) shifting up the efficiency curve. In this study, however, we are primarily concerned with the latter objective. In particular, for our four package models, we work to develop methodologies for risk-adjusting the payments and thereby minimizing the potential adverse impacts on provider equity.

Our discussion of the equity-efficiency tradeoff is necessarily a simplification of reality. In truth, the packaging continuum involves many more considerations and questions. For example, provider equity is believed to be correlated with access to care. If providers are not being compensated fairly for the work performed, they have incentive to discriminate and provide care to only the most profitable patients; and the less profitable patients may have difficulty obtaining health care. Furthermore, capitation-type incentives may cause providers to skimp on necessary care. If so, the cost of health care may be reduced, but the overall efficiency (or appropriateness) of care could also be diminished. That is, there are unanswered questions about how or whether the quality of care varies as one moves along the packaging continuum.

Finally, there are other ways in which payment methods can be adjusted to influence the equity/efficiency tradeoff, as well as movement along the packaging continuum. For examples, payment approaches also vary with respect to the following:

- the extent of retroactive adjustment (e.g., outlier policies);
- the specificity of the bundle definition (e.g., extent of risk adjustment);
- the level of payment (e.g., high or low); and
- the scope of services (e.g., percent of care paid on a given basis).

The four packages examined in this study vary along several of these dimensions. Those differences may be important factors affecting the potential for program implementation.

3.2 A Structure for Evaluating Packaging Alternatives

Our questions with respect to the effect of packaging on the equity, efficiency and quality of care can not be answered merely from conceptual analysis. They can be answered only from the empirical testing and evaluation of well conceived package models. A conceptual analysis can nevertheless be helpful in distinguishing the changed provider incentives and thereby identifying the criteria to be monitored in evaluating the effects on actual provider behavior.

The most fundamental difference between package-based reimbursement and the current system is that the link between **cost** and **revenue** is severed. Providers receive a fixed payment for a given package and the payment is altogether independent of the cost of providing the package. Thus profit (π) on a given patient can be written as:

$$\pi = R - \Sigma P_i * Q_i$$

where

R = package reimbursement;

P_i = the price or "cost" of providing service i; and

Q_i = the quantity of each service i.

Since the marginal revenue associated with providing an additional service is zero, there is strong incentive to increase profits by reducing costs. This can take the form of price effects (i.e., changes in the P_i's) or quantity effects (i.e., changes in the Q_i's).

The price effects emanate from package incentives to buy or provide services at lower cost. This may involve (1) negotiating lower fees for services obtained from other providers; or (2) choosing to produce themselves (presumably at lower cost) those services formerly obtained from other providers.

In general, the quantity responses (e.g., package effects on the numbers of visits, procedures or ancillaries) are likely to be more substantial. Provider changes in the quantities of services provided will have key importance for distinguishing the overall efficiency, cost, and quality consequences of movement towards greater packaging in health care payment.

Providers also have incentive to change the service mix, which encompasses both price and quantity effects. Changes in service mix reduce cost if a lower-cost treatment regimen is substituted for a higher-cost but no more effective alternative.

There are also several undesirable ways in which providers can reduce cost. These include:

- providing fewer necessary services; and
- selecting only patients who need fewer services

The extent to which providers respond to packaging incentives either by reducing quality of care or by reducing access strongly affects the desirability of package-based reimbursements.

In addition to undesirable ways of reducing cost, there may also be ways in which providers can exploit the idiosyncrasies in the reimbursement system to maximize payment for the care provided. Examples of gaming behavior include:

- Upcoding patients into more expensive packages;
- Out-of-package billing; and
- Increasing the number of packages provided.

Given the limitations of claims data, it is often difficult or impossible to distinguish gaming-type responses using Medicare payment records only. Thus, the significance of gaming responses can perhaps only be evaluated from medical records review. Likewise, certain quality of care problems (e.g., inappropriate delegation of responsibility) would not be seen from looking only at the quantities of services provided.

Exhibit 3-1
THE PACKAGING CONTINUUM

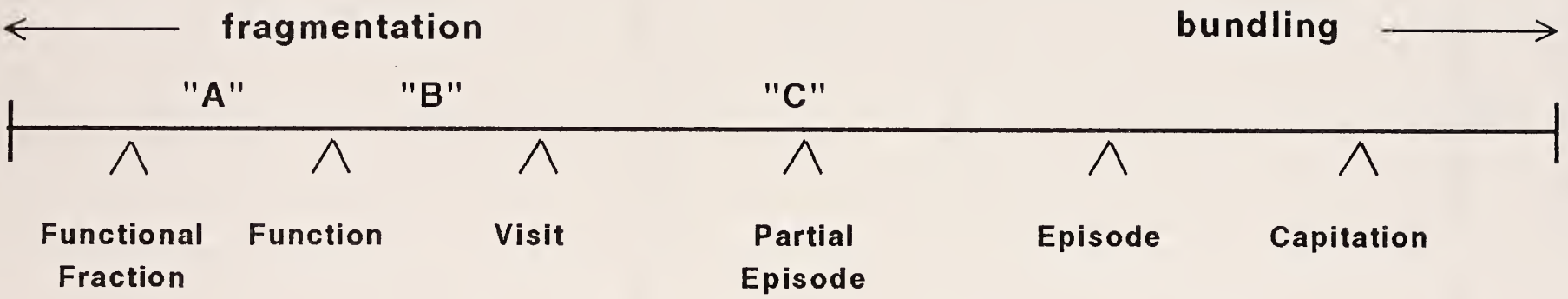
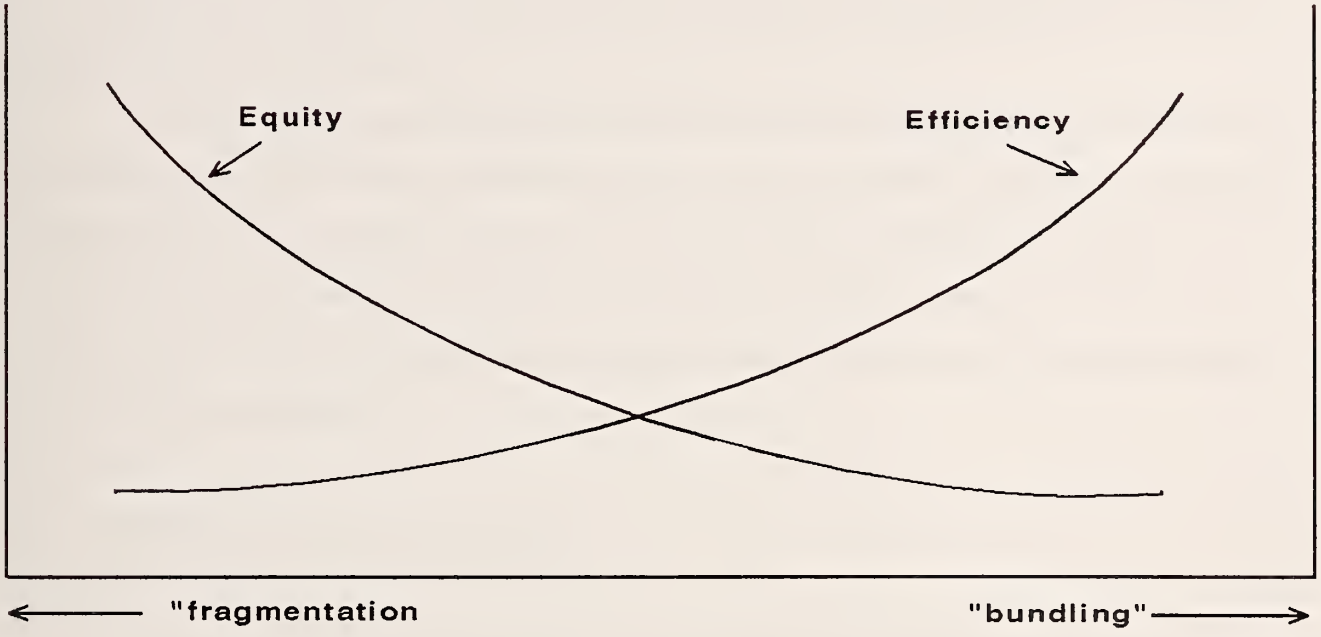
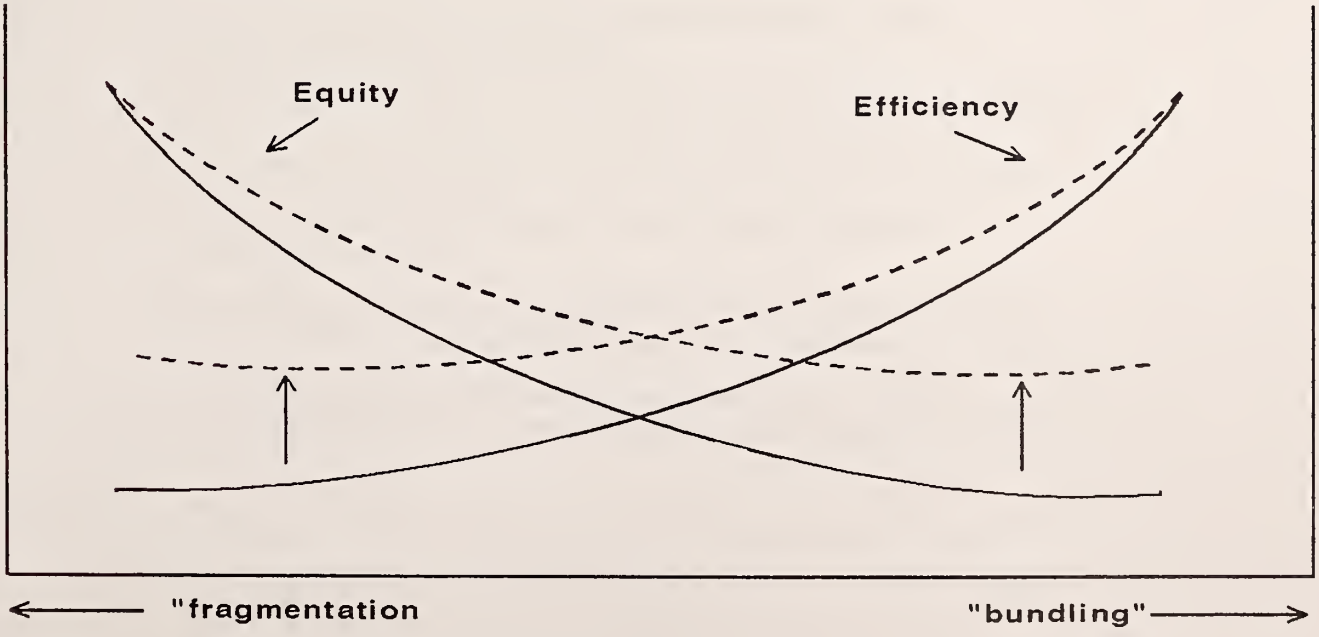


Exhibit 3-2

(a)
THE "EQUITY-EFFICIENCY" TRADE OFF



(b)
SHIFTING OF THE "EQUITY-EFFICIENCY" TRADE OFF



4.0 FOUR PACKAGE MODELS

Four condition-related outpatient service packages are explored for their potential to serve as a basis for payment. The four packages are: (1) laser eye surgery, (2) podiatric services, (3) cardiac testing, and (4) cancer treatment. The key parameters of these packages are summarized in Exhibit 4-1. The characteristics of these packages are described in more detail in the sections that follow.

This chapter is organized as follows. First, the criteria and processes used to select our four pilot test packages are presented in Section 4.1. Second, Section 4.2 discusses definitional considerations and conventions common to all four packages. Third, the four package models are described in Sections 4.3 through 4.6 -- including the rationales, case-mix controls, service content, costs, and potential for bundling. Finally, Section 4.7 appraises the conceptual merits of the four package models.

4.1 Selection of the Four Package Models

In selecting package models, we sought to distinguish practical alternatives for specifying episodes of care without the benefit of outpatient diagnoses. Our choice of packages was guided by their clinical integrity as well as cost-saving potential and feasibility of implementation. The four prototype packages were chosen based on the following criteria:

(1) the package content should be clearly delineated in terms of procedure codes or provider type;

(2) the package should allow for plausible control of case-mix differences;

(3) the package should include multiple, clinically-related services;

(4) the package should permit provider discretion in terms of mix and intensity of service;

(5) the package should involve significant reimbursement expenses -- either in terms of high patient volume or costly package contents; and

(6) the package should involve comparatively few providers and allow for a single provider to coordinate care within the package.

The four packages, laser eye surgery, podiatric services, cardiac testing and cancer treatment, were deemed to meet these criteria. The following section describes in more detail how package parameters were defined in practice.

4.2 Package Parameters

Once the target clinical conditions had been identified, it was necessary to specify exactly what services would be included in each package. Ideally, we would have included all services that were clinically related to a specific episode of care. That would mean answering the following questions:

1. When does the episode start and what is its duration?
2. Which services are included in a given episode of care?
3. How do you structure reimbursement when more than one provider is involved?
4. How do you control for patient severity?

As a practical necessity, we needed to answer these questions from claims data, using only information on provider type and the CPT-4 procedure coding. Except for inpatient claims, diagnostic information, again, were not available. Thus, many assumptions and other methodological concessions were required in defining episodes of care for payment purposes.

The following sections describe the practical assumptions made in answering the above questions for our four package conditions.

4.2.1 Identifying the Package Interval

For all four packages, the start of the package is signalled by an "index" claim. The index claim is identified by a specific CPT-4 procedure code or combination of specific procedure codes. For example, the laser eye package period starts with the first laser eye treatment.

For three of the four packages--laser eye surgery, podiatric services and cardiac testing--the length of time covered by the package is the six-month interval beginning from the date of index service. A one-year package period might have been preferable (and no doubt more appropriate for payment purposes); however, our data design, decided at an earlier stage in the analysis, precluded the longer time interval. In particular, our analytic file included only one year of outpatient claims data and, in order to define a consistent six-month episode of care, we excluded individuals whose index service occurred after June 30, 1988. **De facto**, this meant excluding half the package population from the study. Extending the package interval to more than six months would have meant further reducing the study population. Subjectively speaking, six months seemed to be an adequate package length, while still maintaining reasonable sample size.

An alternative approach was used in defining the package interval for cancer treatment. We were concerned that the clinically-appropriate episode of care for cancer treatment was too variable to specify a fixed-length interval for payment purposes. For cancer treatment only, the package payment was defined in terms of a capitation per month of active cancer treatment--i.e., a fixed dollar amount to be paid per month for each month in which the patient receives cancer treatment. **De facto**, this means that the package payment interval is the same as the interval of active cancer treatment.

4.2.2 Condition-Related Services Included in the Package

The question of which services to include as part of a condition- specific treatment episode was complicated by lack of outpatient diagnoses. As noted above, the services included in our packages were identified from the provider and CPT-4 procedure coding. For example, all services provided by a podiatrist or ophthalmologist during the package interval were included, respectively, in the podiatric services and laser eye packages In the case of cancer treatment, procedure codes were matched to specific providers in defining package content.

For cardiac testing, the procedure codes indicating a cardiac test sufficed to distinguish package services. However, we could not reliably distinguish cardiac care visits from the

claims data. The visits and tests were not infrequently billed by different providers, sometimes on different days, and thus visits and test could not be dependably linked. Thus, unlike the three other package models, the cardiac testing package includes only multiple procedures, albeit one typically provided in association with multiple visits.

The four packages described in Exhibit 4-1 do not include all services related to the clinically-appropriate episodes of care. Some services would have been excluded because they occured outside the specified six-month time interval. For example, the initial visit with an ophthalmologist identifying the need for laser eye surgery would have occurred before the date of the index procedure, which begins the observational interval.

Likewise, some condition-related services would not have been included simply because the procedure code or provider type did not indicate a conspicuous relationship to the condition. For example, with regard to cancer treatment, cancer patients need a variety of services to measure the response to treatment (e.g., blood tests), not all of which are readily identifiable as cancer treatment.

Including services unrelated to a condition is also a problem. For example, not all services provided by an ophthalmologist within six months after a laser eye treatment would necessarily have been related to that treatment. However, in general, we chose to err on the side of omitting potentially related services rather than including unrelated services.

Only outpatient services are included in the study packages. We also considered including inpatient services, but decided not to do so. Our reasons for excluding inpatient services were as follows:

- the providers are frequently different;
- there are more providers per patient; and
- the technical components of various services are bundled into the DRG payment rate.

In the case of the laser eye surgery and podiatric services, the focus on outpatient services is not a problem, because the vast majority of services in these two packages are provided on an outpatient basis. However, for cancer treatment and cardiac testing, there is significant potential for substitution between inpatient and outpatient services.

4.2.3 Identifying the "Gatekeeper"

The question of how to structure reimbursement when more than one provider is involved is addressed by designating a "gatekeeper" for each outpatient package. In general, the gatekeeper is the provider of the index procedure (i.e., the first package service provided). This provider would receive, or be responsible for the entire packaged payment amount; and he or she would assume responsibility for payment to any other package providers.

Again, we have designated the gatekeeper as being the first provider of package services. Alternative designations are clearly tenable--e.g., the provider of the most services, or the provider with the most charges. However, in all four packages, the gatekeeper, as we have designated it, accounts for 70 percent or more of the allowed charges in each package.

4.2.4 Identifying Package Subgroups to Partially Control for Severity of Condition

The last question, of how to control for severity within package, was addressed differently for each package. We sought to achieve some control for patient severity by distinguishing patient cohorts within each package that had different clinical needs. In the case of cancer treatment, for example, we felt it was important to control for the type of cancer. Thus, we restricted our patient sample to those who had been hospitalized for cancer in either 1987 or 1988--patients for whom the type of cancer could be established from admission diagnoses. This not only permitted control for type of cancer, but it also meant focusing only on patients with at least one cancer hospitalization.

For two other packages--laser eye surgery and podiatric services--we similarly divided package patients into various cohorts, giving an admittedly eclectic control of case-mix differences. In the simulation analyses, different package rates are calculated (as appropriate) for each cohort within the larger package. The cohort specifications are discussed below.

Sections 4.3 through 4.6, below, present detailed descriptions of the four package models: laser eye surgery, podiatric services, cardiac tesing, and cancer treatment. The rationales for selecting each particular condition, our controls for case severity, and specific package definitions are discussed with regard to each package. In addition, summary

information is presented on the actual package contents and costs. We also describe the alternative packages definitions that were explored.

4.3 Laser Eye Surgery

4.3.1 Rationale

Laser surgery has become the treatment of choice for diabetic retinopathy, after-cataracts, detached retina, and for certain localized lesions of the retina. Packaging episodes of treatment has merit since multiple procedures are often performed and are accompanied by visits and diagnostic studies to evaluate the effects of treatment.

The present study focuses on laser treatment of diabetic retinopathy and after-cataracts. The natural history of these two conditions creates very different implications for packages.

Diabetic retinopathy is a chronic progressive condition that may require repetitive treatments over a period of years. Major questions involve definition of appropriate clinical indications for treatment and whether treatment should be administered on a single or multiple procedure basis. Detailed clinical evaluations are needed to make these determinations. Package reimbursement, nevertheless, must take into account the longer time course required for multiple treatments.

After-cataract treatments, on the other hand, are usually the near-term sequelae of cataract extractions. They result from opacification of the residual posterior capsule of the lens. Questions of need for laser treatment relate to the degree of visual impairment (a threshold phenomenon very similar to the intital decision to perform cataract surgery in the first place). Only a single laser treatment may be required.

4.3.2 Cohort Definitions

Our analyses focus on outpatient laser treatments for two conditions, diabetic retinopathy and after-cataracts. Conveniently, the CPT-4 procedure codes for laser eye surgery indicate the diagnoses, namely, procedure 67288 for diabetic retinopathy and

procedure 66821 for after- cataract surgery. Approximately two percent of package patients received treatment for both conditions. They were excluded from the study.

4.3.3 Package Contents

For each package patient, the index procedure was defined as the first laser eye surgery performed by an ophthalmologist. The provider of that laser treatment was designated the gatekeeper. Included in the package were all laser treatments, all visits, and all other services performed by any ophthalmologist within six months of the index procedure. The study population was limited to those whose index procedure occurred over the three-month period between April 1 and June 30 of 1988. Patients with treatments before April 1 were excluded to increase the likelihood that the index procedure was the initial treatment in the current episode of care. Patients whose index procedure occurred after June 30 were excluded to allow for a consistent six-month interval of service monitoring subsequent to the index procedure.

4.3.4 Package Description

Exhibit 4-2 provides basic information on the two laser eye package cohorts. Laser eye surgery for after-cataracts is more common in the Medicare population. We identified 7676 sample beneficiaries who received laser eye treatment for after-cataracts during our three-month period. This compares to only 951 sample beneficiaries who received treatment for diabetic retinopathy.

The two patient cohorts are quite different in their patterns of care. Diabetic retinopathy patients receive almost twice as many services per episode, and they cost more than twice as much as after-cataract patients. Diabetic retinopathy patients receive an average of 1.7 laser eye treatments, with 15 percent having more than two. They average five services in total during the six-month package interval, with almost nine percent having more than ten services during the package interval.

Substantially fewer services are provided to after-cataract patients. They average only 1.1 laser eye treatments and three services in total. Less than one percent have more than two

laser eye treatments. After-cataract patients average three services and fewer than 2 percent have more than ten services in the package period.

Only seven percent of diabetic retinopathy patients had all their services within the first week after surgery, compared to 26 percent for after-cataract patients. Diabetic retinopathy patients were also more likely to have more than one provider. However, the vast majority of charges, over 90 percent in both cases, were attributed to the index provider.

Exhibit 4-3 shows that, while the laser treatments themselves account for only a third of the package services provided, they account for over two-thirds of the cost. Visits and evaluations comprise a third of the services but only three percent of cost. Examinations account for 25 percent of services provided to diabetic retinopathy patients, but they account for only eight percent of services provided to after-cataract patients. Even so, in both instances, examinations represent a comparatively small percentage of cost.

4.3.5 Strengths and Limitations

The major strength of the laser eye package is the availability of diagnostic-specific procedure codes, permitting case-mix control. Furthermore, since the codes are actually required for reimbursement, they are likely to be accurate. Another strength is the comparatively limited role of secondary providers in providing package services. There is a single package provider in the vast majority of cases, which simplifies administrative arrangements.

There are several potential problems with the laser eye packages. First, patient severity, and thus risk, is not evenly distributed across providers. Second, even if there is adequate control for case-mix, providers may not have enough cases to diversify the risk. Eighty-three percent of sample providers treated 20 or fewer package patients, both cohorts combined. On the other hand, providers treating more than 20 patients account for 57 percent of all patients. Our sample substantially understates annual procedure volume, since only those individuals with a first treatment between April 1 and June 30 were included. Thus, about three-fourths of the package-eligible patients would not have been included in the study.

An additional weakness may be the limited potential for cost savings. Since more than 70 percent of the package cost is represented by the laser treatments themselves, meaningful savings would only be achieved if the numbers of laser procedures could be reduced.

After-cataract treatment is more common, but it has many fewer services associated with it. Thus, although after-cataract packaging has a lower cost- savings potential on a per patient basis, it could still have a greater overall potential for cost savings.

Finally, packaging does not address the issue of treatment thresholds for laser eye surgery. While packaging may reduce the number of treatments and ancillary services associated with laser eye surgery, it would have no effect on incentives to provide the initial surgery.

4.3.6 Alternative Package and Cohort Definitions

Laser eye surgery is used for other conditions in addition to diabetic retinopathy and after-cataracts. We examined laser treatment for detached retinas. This treatment was found to be infrequent in the Medicare population, and consequently was not considered a good candidate for analysis.

4.4 Podiatric Services

4.4.1 Rationale

Services rendered by podiatrists cover a broad spectrum of procedures for the nails and feet. Peripheral vascular insufficiency, arthritic changes, and other effects of age increase the need for such services in Medicare beneficiaries. Also contributing are the reduced self-care abilities of the elderly. Many podiatric procedures are administered repetitively and involve considerable discretion on the part of the provider, both with respect to the need for treatment and intervals between treatments. This is particularly true for procedures to treat nails and for the prescription of various orthotic devices. These characteristics suggest that packaging could be useful in limiting overuse.

4.4.2 Cohort Definitions

Patterns of podiatric services are examined in three subgroups or cohorts, as follows:

(1) Foot Cohort--patients who received one or more foot procedures (CPT-4 codes 28001-28760)

(2) Nail Cohort--patients who received at least one nail procedure (CPT-4 codes 11700-11762, M0101) but no foot procedure

(3) Nonprocedure Cohort--patients who had at least two claims with a podiatrist, but no foot or nail procedure claims

Foot procedures are more extensive and more costly, and services commonly relate to a specific problem. Nail procedures, on the other hand, more often relate to chronic health maintenance, and thus patients require continuing, repetitive care.

The Nonprocedure Cohort encompasses a mixed group of patients. Preliminary analysis showed that 29 percent of patients without a foot or a nail procedure had only one claim, compared to four percent for those with a foot procedure and 13 percent for those with a nail procedure. As a result, we limited our patients in the Nonprocedure Cohort to individuals who had at least two outpatient claims with a podiatrist. Services rendered to individuals in the Nonprocedure Cohort include skin procedures, radiology, physical medicine and others.

Individuals were not excluded from the Foot or Nail Cohorts if they had only one claim, since the procedures themselves were considered sufficient to identify an underlying foot problem. Foot procedures were considered representative of a more serious underlying condition; and thus individuals were assigned to the Foot Cohort even if they also had one or more nail procedures.

4.4.3 Package Content

For each cohort, the package content includes all outpatient services provided by any podiatrist during the six months following the date of the index procedure. If no foot or nail procedure was performed, the starting date for the Nonprocedure Cohort package was the

date of the first podiatric service, for patients that had at least one more podiatric service during the ensuing six-month interval. The provider of the first outpatient podiatric service was designated as the gatekeeper. To ensure a six month period of observation, the index or qualifying podiatric service had to have been rendered by June 30, 1988.

4.4.4 Package Description

Podiatric services are very common in the Medicare population. We identified 4,623 individuals in the Foot Cohort, 74,123 individuals in the Nail Cohort, and 38,123 individuals in the Nonprocedure Cohort. This represents 4.6 percent of Medicare enrollees in the five states.

Exhibit 4-4 indicates the service frequency and costs for each cohort. The pattern of service utilization differs substantially between those in the Foot Cohort and those in the other two cohorts. Patients in the Foot Cohort use a greater quantity of services, and services tend to be concentrated in the early months of the observational interval. In particular, patients with a foot procedure had an average of seven package services, compared with just under four services for the other two cohorts. Furthermore, 84 percent of all Foot Cohort services occurred during the first three months of the package interval, compared to only 63 and 67 percent, respectively, for the Nail and Nonprocedure cohorts. The Foot Cohort had a higher average cost per patient, not only because of higher service utilization but also because of a higher cost per service. There was not much difference in the utilization and cost of services between the Nail and Nonprocedure cohorts.

Exhibit 4-5 shows the distribution of services and costs for the three cohorts. In the Foot Cohort, foot procedures (CPT-4 codes 28001-28760) comprise almost 80 percent of the costs but only 32 percent of services. Radiology is next most important in terms of services and charges.

In the Nail Cohort, by definition, there are no foot procedures. Nail procedures make up roughly three-fourths of the services and charges. Radiology is not heavily used, but visits and consultations make up nine percent of both services and cost.

In the Nonprocedure Cohort, visits and consultations comprise the bulk of the services and costs. The "other" category of services includes, skin procedures, casts, and other miscellaneous services.

4.4.5 Strengths and Limitations

A major strength of podiatric service packaging lies in the repetitive and discretionary nature of many services (e.g. nail trimming), as well as the sheer volume of patients and services. Also, packaged payment of podiatric services would not confront significant administrative problems, since 90 percent of patients have only one podiatric provider.

Not surprisingly, most podiatric providers have many Medicare patients. Only 20 percent of providers treated 20 or fewer patients, and 86 percent of all patients were treated by large volume providers, those treating 100 or more patients. Furthermore, our numbers understate the numbers of patients per provider, since we eliminated half of the patients by excluding those whose index encounter with the podiatrist occurred after June 30. The comparatively large numbers of services per patient and the large numbers of patients per provider combine to offer a significant cost-savings opportunity, even if the cost per service is modest.

Limitations, as in all the packages, relate primarily to the inadequate diagnostic and other case-mix information available from claims data. For example, the importance of nail care and foot hygiene is especially critical in patients with diabetes or peripheral vascular insufficiency. The intensity of podiatric services may be justifiably greater in such patients. To the extent that podiatric practices vary because of other co-existing conditions, packages that do not adjust for such case-mix variables may be inequitable. For example, podiatrists who serve nursing homes or group practice diabetic clinics may be at particular risk.

4.4.6 Alternative Package and Cohort Definitions

An alternative definition of the podiatric package cohorts was explored. The alternative definition used the initial claim with a podiatrist as the index claim. A patient would then be moved up into the Foot or Nail Cohorts upon receipt of either a foot or nail procedure, respectively, during the ensuing six-month interval. Providers, for example, would initially be reimbursed based at the Nonprocedure rate, but they would then submit

claims for additional reimbursement if the patient subsequently received a foot or nail procedure. We decided, however, that such a payment arrangement would be too unwieldy. In actual practice, we reasoned that the initial patient evaluation would be sufficient to determine cohort assignment for the ensuing package interval.

4.5 Cardiac Testing

4.5.1 Rationale

Cardiac tests are used to define the etiology and severity of cardiac disease, to guide treatment decisions and to monitor responses to treatment. Growth in both non-invasive and invasive testing technologies has greatly improved the ability of physicians to identify cardiac disease in pre-symptomatic stages and to target treatment more effectively. At the same time, the use of these technologies has increased the costs of care and created the opportunity for excessive utilization. Packages of services, defined in terms of tests needed to establish a cardiac diagnosis or to monitor established disease over time, could provide incentives for the cost-effective use of services. Major challenges are to identify populations that are sufficiently homogeneous that the packages are clinically meaningful and reimbursement is equitable.

4.5.2 Cohort Definitions

Patterns of cardiac testing are examined in all individuals who have had at least two major cardiac tests in a six-month interval. Major cardiac tests include stress tests (CPT-4 codes 93015-93018), echocardiograms (CPT-4 codes 93300-93320), myocardial perfusion (CPT-4 codes 78460-78469) and cardiac blood pool (CPT-4 code 78471-78489). Individuals who had only EKG's (CPT-4 codes 93000-93014, 93040-93045) were not included in the sample, although EKG's were included in the package for those who met the two major test criterion.

Some major cardiac tests were not included in the package. Cardiac flouroscopy was not included because of its infrequency in the Medicare population. Several other cardiac

tests, such as cardiac catherization, diagnostic radiology, and intracardiac electrophysiological procedures, while increasingly being performed on an outpatient basis, are much more expensive and also comparatively infrequent in our study cohort. They were were included in early testing of the cardiac cohort, but the resultant cost distributions were simply too skewed to use for practical payment purposes.

The restriction to two major tests was intended to capture only those individuals in whom heart disease was established or seriously suspected. They may have had a prior cardiac hospitalization or they may have been hospitalized during 1988, based on information provided by these tests. The heterogeneity of the patients in this package could perhaps be reduced with the availability of outpatient diagnoses, but that should not be assumed.

4.5.3 Package Content

The cardiac testing package, again, includes the following major cardiac tests: stress tests, echocardiograms, myocardial perfusion, cardiac blood pool, and EKG's. We were not able to include visit fees in the cardiac testing package because it was not possible to reliably associate a given visit with a cardiac test. Visits and tests were often done by different providers, sometimes on different days, and thus visits and tests could not be easily linked. Also, visits on the same day, even with the same provider, may include services unrelated to the patient's heart condition.

The first provider of a major cardiac test was designated the gatekeeping provider, unless the provider designated specialty was clearly inappropriate (e.g., laboratory).* If the first provider was deemed ineligible, the second provider was designated the gatekeeper. If an eligible provider could not be identified, that patient was excluded from the study.

The package interval was the six-month period beginning with the date of the first major outpatient cardiac test. Hence, only patients with a first major cardiac test before June 30 were included, and then only if they had a second major cardiac test during the following six months.

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*Other provider specialties deemed inappropriate were anesthesiology, pathology, psychiatry, radiology, nuclear medicine and audiology. Five osteopaths were also inadvertently excluded.

4.5.4 Package Descriptions

Exhibit 4-6 describes the cardiac testing package. There were 19,311 individuals included in this sample. Each individual had an average of 3.5 tests, including EKG's, and total package costs averaged $363 per patient. Patients were quite likely to see multiple providers for cardiac testing purposes. Only 46 percent of patients had all their testing done by a single provider. Nevertheless, the index providers still accounted for 68 percent of services and 75 percent of charges.

Exhibit 4-7 shows the distribution of services and adjusted charges for the different tests. Echocardiograms were the most frequently applied test, followed by EKG's and stress tests. Myocardial perfusion and cardiac blood pools were the more expensive tests, $149 and $145, respectively, but they make up only 13 percent and three percent, respectively, of services. EKG's were comparatively inexpensive at $29 per test; and while they represented 26 percent of testing volume they only comprised seven percent of package costs.

4.5.5 Strengths and Limitations

The major strengths of a cardiac testing package are as follows: (1) the high prevalence of cardiac disease, (2) the high frequency with which these tests are performed, (3) their potential for overuse, and (4) their high aggregate cost. Incentives for the more cost-effective use of these modalities could lead to significant cost savings. Also, the comparatively high prevalence of cardiac disease suggests that averaging across physicians practices may be feasible.

There are several limitations to our analysis. The first is imposed by the absence of diagnostic and disease severity information in claims data. We have tried to reduce clinical heterogeneity by including only relatively high utilizers of cardiac tests. However, even within that group, there is likely to be a very wide dispersion of heart disease severity. Moreover, our package includes only patients whom the physician chose to test. Hence, it does not address the very important issues of clinical thresholds for testing or the incremental value of the test information obtained.

An additional limitation is the extent to which there is substitutability between inpatient and outpatient cardiac testing. In our sample, 33 percent of patients had a hospital admission with a cardiac diagnosis during their six month package period. Of these, 73 percent, or 24 percent of all patients, had at least one inpatient cardiac test. This substitutability between inpatient and outpatient testing raises serious problems for packaging outpatient cardiac tests separately.

For cardiac tests performed in a physician's office, the cardiac testing package includes both the professional and technical components. However, for tests performed in a hospital outpatient department, the package includes only the professional component inasmuch as the technical component is paid separately under Part A. This fundamental asymmetry--which is only more important for cardiac testing than for the other package models included in this study--presents a potentially serious problem in packaging outpatient physician services, one that can not be easily resolved as long as payment arrangements vary by setting. As a practical matter, however, the cohorts should perhaps be differentiated by practice setting of the gatekeeping provider in any future analyses.

4.5.6 Alternative Package and Cohort Definitions

Several alternative package definitions were analyzed in an effort to control for the severity of heart disease among those who received cardiac testing. One distinction was made between (1) those who had been hospitalized with a cardiac diagnosis in 1987, the prior year, (2) those who were hospitalized in 1988, the study year, and (3) those who had never been hospitalized. We found that a cardiac hospitalization was not a good indication for use of outpatient cardiac testing. Patients with a cardiac hospitalization, in either 1987 or 1988, averaged only 0.3 major tests and 1.6 outpatient EKG's during a 12-month period. Of those hospitalized in 1987, only 18 percent subsequently had a major outpatient cardiac test in 1988. We also decided that it would not be practical to differentiate payment according to whether or not someone had been previously hospitalized. Clearly, other alternatives for case-mix control need to be explored (e.g., reason for testing).

4.6 Cancer Treatment

4.6.1 Rationale

Cancer treatment offers interesting opportunities for packaging, both because of the multiplicity of possible treatment regimens and the fact that these are usually administered over periods of months. Choice of treatment depends on the type of cancer and the degree of spread at the time treatment is begun. Chemotherapy may be administered alone or combined with radiotheraphy. Thus, there is a potential for substitution of treatment regimens.

The present analysis controls for type of cancer but is not able to assess the effects of cancer cell type, stage of spread, or comorbidities on the package of services. These are important empirical questions for subsequent studies.

4.6.2 Cohort Definitions

Our study sample included only patients with a hospital admission for cancer in either 1987 or 1988, because a cancer admitting diagnosis was needed to distinguish cancer type. Patients were grouped by cancer type according to their most recent, first-listed ICD-9 diagnosis of cancer. Thus, a patient with a first diagnosis of skin cancer in 1987 and a second diagnosis of lung cancer in 1988 was categorized as having lung cancer. The diagnoses were grouped into cancer types by organ systems: digestive (150-150.99), respiratory (160-165.99), breast (174-175.99), blood and lymph (200-208.99), and other (lip, mouth, gum:140-149.99; bone:170-171.99; skin:172-173.99; genitourinary organs: 179-189.99; brain, thyroid, unspecified:190-199.99). The "other" category was a catchall for many different types of cancers for which there were few observations; and, thus, it may not be a meaningful category.

4.6.3 Package Content

Cancer-related services are difficult to reliably distinguish from claims data because chemotherapy is provided by many specialties, but principally internists, who may also be

treating patients for other conditions unrelated to the cancer. If the gatekeeper were identified as being an oncologist, we would have greater confidence that the services provided were cancer related. However, oncology is coded as a separate specialty only in one of the five states examined (Connecticut). In the other states, the majority of chemotherapy providers were internists.*

The first provider of outpatient chemotherapy was deemed the gatekeeping provider for a given patient. However, as with cardiac testing, certain provider types (e.g., laboratories and medical supply companies) were excluded as eligible gatekeepers. If an inappropriate provider had been initially identified as being the gatekeeper, the next eligible chemotherapy provider was substituted. If no eligible provider could be found from the claims data, the patient was excluded from the study.

We assumed that all services provided by the gatekeeping provider were related to cancer, and all of their services were included in the package. All chemotherapy services, chemotherapy drugs, and radiotherapy provided by anyone were also included in the package. In addition, visits to any provider of chemotherapy on the same date as the chemotherapy were included. While this did not resolve the twin problems of (1) excluding cancer-relevant services from the package or (2) including unrelated services, a cancer treatment package could not otherwise have been developed in the absence of outpatient diagnoses.

Unlike the other three package models, the cancer treatment package was defined on a monthly capitation-like basis. We considered that a fixed-dollar package payment would be made for each month for which the patient was receiving active cancer treatment. A patient was considered to be undergoing active cancer treatment in a given month if he or she received either (1) chemotherapy, (2) radiotherapy, or (3) had a visit with the gatekeeping provider during the month.

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*An improvement in coding of oncology specialities should be realized in 1992 and subsequent years. HCFA has expanded specialty codes and allowed physicians to redesignate their speciality.

4.6.4 Package Description

Exhibit 4-8 provides basic information on the cancer treatment packages by diagnostic cohort. Blood and lymph cancer was the most frequent type of cancer, followed by cancer of the digestive system. Respiratory cancer was the most expensive per month of active treatment; and the second most expensive cancer per month of active treatment was digestive cancer (although this was not true in all states). The average package cost per month did not differ significantly across other diagnoses. As with the other packages, the vast majority of patients, 75 to 85 percent, stayed with one provider for their entire package program, and the majority of costs, 72 to 86 percent, were incurred by the designated gatekeeper.

The cancer treatment package includes a large number of relatively inexpensive services, with patients receiving 13 to 16 services per month of active treatment. This is true in spite of the fact that the package probably excludes many services (e.g., blood tests and x-rays) used to monitor progression of the disease. The average cost per service ranges from $18 to $25.

Exhibit 4-9 compares the package contents across the different cancer cohorts. Chemotherapy comprised 48 to 54 percent of package expense, radiotherapy comprised 8 to 24 percent, and visits comprised 10 to 17 percent. The treatment regimens look quite different across cancer types. For example, cancer of the respiratory system was treated with less chemotherapy and more radiotherapy; 43 percent of respiratory cancer patients received radiotherapy, compared with 16 to 24 percent for other cancers. Also, respiratory patients received fewer months of chemotherapy, three months on average, compared to at least four months for the other cancers. The more extensive use of radiotherapy with respiratory cancer may partially account for its higher cost.

4.6.5 Strengths and Limitations

A major strength of this package is its potential for combining so many different services into a package for one well-defined condition. The many alternative treatment regimens and the multiple services provided means that there are substantial opportunities for cost-saving substitution.

A major advantage and limitation of the cancer treatment package is the substitutability of inpatient and outpatient care. On the one hand, there is an opportunity to reduce cost by substituting outpatient treatment for inpatient treatment. On the other hand it provides the opportunity for providers to maximize reimbursement by switching treatment between the two settings or providing treatment in both. Preliminary analysis of our data indicated that about 40 percent of chemotherapy patients are hospitalized with a cancer diagnosis during the treatment year. It is not clear whether those hospitalizations were for cancer treatment or side effects of the cancer.

Another major limitation relates to the potential financial risk across providers, associated both with case-mix variability and low patient volume. Diagnosis alone may not adequately control for case-mix; and, given the severity of cancer as a disease, there is probably more variability in resource needs across cancer patients than in any of the other three packages. We were concerned from the outset that, except for all but the most common diagnoses and the most active practitioners, averaging costs could result in significant inequities. This would be particularly true for providers which treat only a few cases. In our sample, 94 percent of the providers treated twenty or fewer cases. However, 40 percent of all cases were treated by the larger volume providers. Furthermore, the actual importance of this problem is overstated by the restriction of our sample to individuals with a cancer hospitalization during either 1987 or 1988.

Another limitation of the cancer treatment package was our inability to distinguish, with confidence, those services provided for the treatment or monitoring of the neoplastic process and side effects versus those services provided for other unrelated conditions. For example, blood tests needed to monitor response to treatment and side effects should be included in a cancer treatment package, while those related to co-existing heart disease should not. This problem would be greatly reduced if diagnoses were reliably reported on outpatient claims. Though we were able to exclude many clearly unrelated services from our package, judgements with regard to other services were difficult.

4.6.6 Alternative Package and Cohort Definitions

In preliminary analyses (using only Connecticut data), we focused on services provided by an oncologist, so identified. We subsequently discovered, however, that

oncology was coded as a separate specialty only in Connecticut, and that alternative had to be abandoned.

We also originally included all patients receiving chemotherapy in 1988. We subsequently decided that, in view of the practice variability found, it was imperative to control for cancer type. Thus, we limited our analysis to those patients who had been hospitalized for cancer in either 1987 or 1988. This restriction meant excluding about half of all patients in active cancer treatment during 1988.

We briefly investigated the ramifications of excluding radiotherapy from the cancer treatment package. For all except one cancer type, the results were somewhat less favorable (i.e., the CVs were higher). Such finding is broadly consistent with the hypothesis that radiotherapy and chemotherapy are substitutes for one another.

4.7 Appraisal of Provider Incentives and Opportunities in the Four Package Models

Our four study packages give the package provider clear financial incentive to reduce both the quantities and prices of **services included within the package** as discussed in Section 3.2. Package providers can reduce the unit prices or costs by doing either of the following, (1) negotiating lower fees for services obtained from other providers or (2) choosing to produce themselves, presumably at lower cost, those services formerly obtained from other providers. Package quantities can be reduced by providing, or ordering, fewer visits, fewer procedures and fewer ancillaries. In addition, it may be possible to reduce total package costs by changing the service mix and substituting lower-cost services for higher-cost ones (e.g., a less expensive chemotherapy regimen).

To the extent that package services are currently being provided inefficiently--too many services or services that are unnecessarily expensive--packaging should have the effect of improving practice efficiency. On the other hand, packaging also gives undeniable incentives to provide fewer services than appropriate or otherwise provide substandard care. In implementing the study packages, one must assume that professional standards and peer oversight will preclude such inimical behavior on a broad scale--and indeed that has been the experience of HMOs in capitating primary care physicians and other providers. Nevertheless, one cannot preclude the possibility that a small minority of providers will take advantage of

the situation and behave irresponsibly. To avoid or minimize such prospects, any demonstration or program implementation must incorporate some mechanism for review or audit of the lowest-cost or lowest-use providers (i.e., low cost outliers).

Perhaps the greatest challenge to implementing multiple visit-based packaging is controlling the **numbers of packages** provided to Medicare beneficiaries. A provider's package revenues will vary directly with the number of package patients, giving the provider substantial financial incentive to qualify additional patients for payment on that basis. The problem is less severe for cancer treatment and possibly even laser eye surgery, than it is for cardiac testing and podiatric services. There is comparatively little or no discretion involved in distinguishing patients who require cancer treatment. The clinical thresholds, however, for distinguishing patients who require cardiac testing or podiatric treatment are lower and considerably more ambiguous. The financial stakes are much higher, and packaged payment makes it much more lucrative for a podiatrist, for example, to seek out or solicit additional patients with untreated nail or foot problems, or to provide more service to a patient to qualify for a higher package reimbursement rate. In order to avoid abusive expansion in the numbers of package patients, it may be necessary to establish and administer explicit criteria for establishing patient eligibility.

The potential for **"out-of-package" billing** should be a somewhat less serious concern. As presently conceived, our four packages offer limited opportunity for shifting care to other ambulatory care providers who would not be paid within the package. Indeed, in order to avoid such prospects, we have deliberately chosen broad package definitions. While our four packages undoubtedly include some services unrelated to the clinically-appropriate episodes of care (e.g., opthalmalogic treatment unrelated to the after-cataract requirements for laser eye surgery), it was simply infeasible to do otherwise. Given the idiosyncrasies of provider billing and reimbursement, one can not reliably differentiate episode-related and nonepisode-related care provided by the same or similar providers. Furthermore, if our packages had tried to make such distinction, we anticipate that it would be comparatively easy for providers to shift care outside of the package.

Our packages nevertheless involve significant potential for shifting care into the inpatient hospital setting. Much cardiac testing and cancer treatment, for examples, are done on an inpatient basis, and such inpatient care unquestionably substitutes for ambulatory services included in the cardiac testing and cancer treatment packages. This does not present a problem as long as the relative distribution of inpatient services remains constant and can be anticipated (on an expected value basis) in the package payment rates. However, under our hypothetical, ambulatory care-only payment system, the package provider who anticipates an expensive cardiac testing or cancer treatment regimen may be more willing to admit his or her patient to the hospital and thereby shift payment liability back to the Medicare program. Presumably, providers would not take such drastic action for the sake of offloading comparatively small payment liabilities; and an outlier payment methodology could mute the advantage of shifting larger liabilities, by assuring the overall equity of the payment system. In addition, we assume that the PROs (or Provider Review Organizations) will continue their institutional responsibility as hospital gatekeepers, and help to assure that Medicare beneficiaries are not being admitted inappropriately.

Packaging may also create incentives for patient skimming (i.e., providers accepting only less complicated patients). If so, the patients with more complicated problems may have difficulty obtaining access to care. The best way to avoid such problems is to construct packages in such a way that providers accepting package patients do not know a priori whether or not they are good risks. This may not prove feasible. If not, the access concern is one which must receive considerable attention in actually designing the administrative procedures for packaged payment. Like the quality of care concern, the access concern could also be met through a plan for targetted review of the lowest cost providers. Providers who systematically decline to accept more expensive patients could be penalized or paid on a reduced rate basis.

Exhibit 4-1

Major Attributes of the Four Package Models

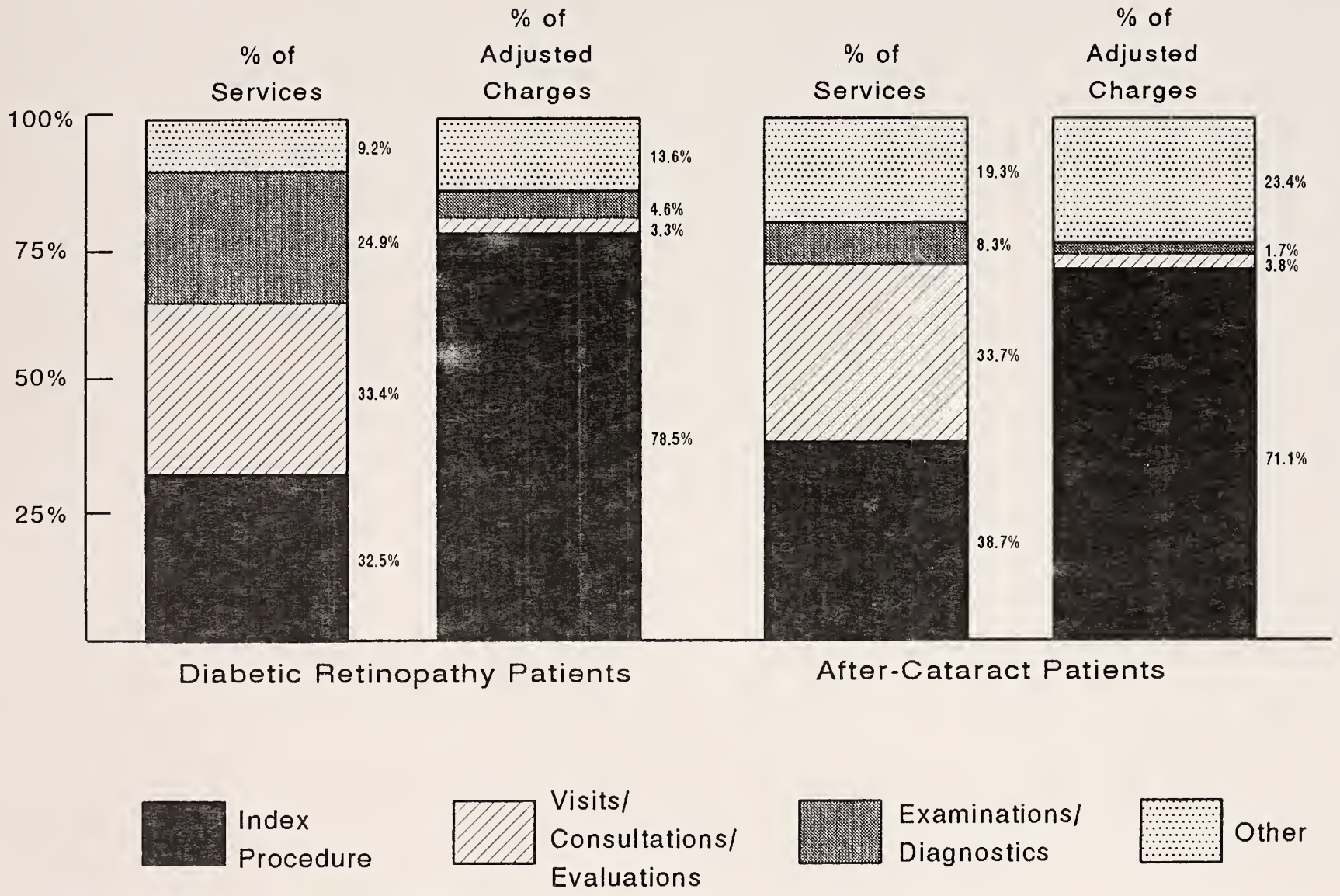
	Laser Eye Surgery	Podiatric Services	Cardiac Testing	Cancer Treatment
Type of Provider	Ophthamologist	Podiatrist	All Providers	All Providers of Chemotherapy or Radiotherapy
Type of Service	– Laser Eye Treatments – Visits – Other	– Procedures – Visits – Other	– Cardiac Testing	– Chemotherapy – Radiotherapy – Visits/Other Associated with Chemotherapy
Cohort	1. Diabetes retinopathy 2. After–Cataract	1. Foot Procedures 2. Nail Procedures Only 3. No Procedures	Two Major Cardiac Tests in Six Months	Diagnosis from Cancer Admisssion
Period of Time	Six Months From First Laser Eye Surgery	Six Months From First Procedure or First Visit	Six Months From First Major Cardiac Test	One Month

EXHIBIT 4-2

DESCRIPTION OF LASER EYE SURGERY PACKAGES

	Diabetic Retinopathy Patients	After-Cataract Patients	Both Cohorts
Number of patients	951	7,676	8,627
Average adjusted charge/patient	$1,660	$767	$866
Number of services/patient	5.2	2.9	$3.1
Average adjusted charge/service	$319	$268	$277
Average number of laser eye treatments/patient	1.7	1.1	N/A
Averge adjusted charge/laser eye treatment	$769	$491	N/A
Number of index providers	197	633	685
Average number of patients/provider	4.8	12.1	12.6
Percent with index provider			
Services	83.3%	90.1%	88.9%
Charges	93.5%	96.1%	95.6%
Percent patients with			
One provider	71.0%	89.8%	87.7%
One or two providers	95.4%	98.9%	98.5%
Percent of providers treating			
1-5 patients	77.7%	44.4%	41.8%
6-10 patients	10.1%	23.8%	23.7%
11-20 patients	8.6%	15.1%	17.1%
more than 20 patients	3.6%	16.7%	17.4%
Percent of patients treated by providers treating more than 20 patients	16.6%	57.4%	57.1%

Exhibit 4-3
Distribution of Charges and Services Included in Laser Eye Surgery Package



SOURCE: 1988 Part B Data, Five states.

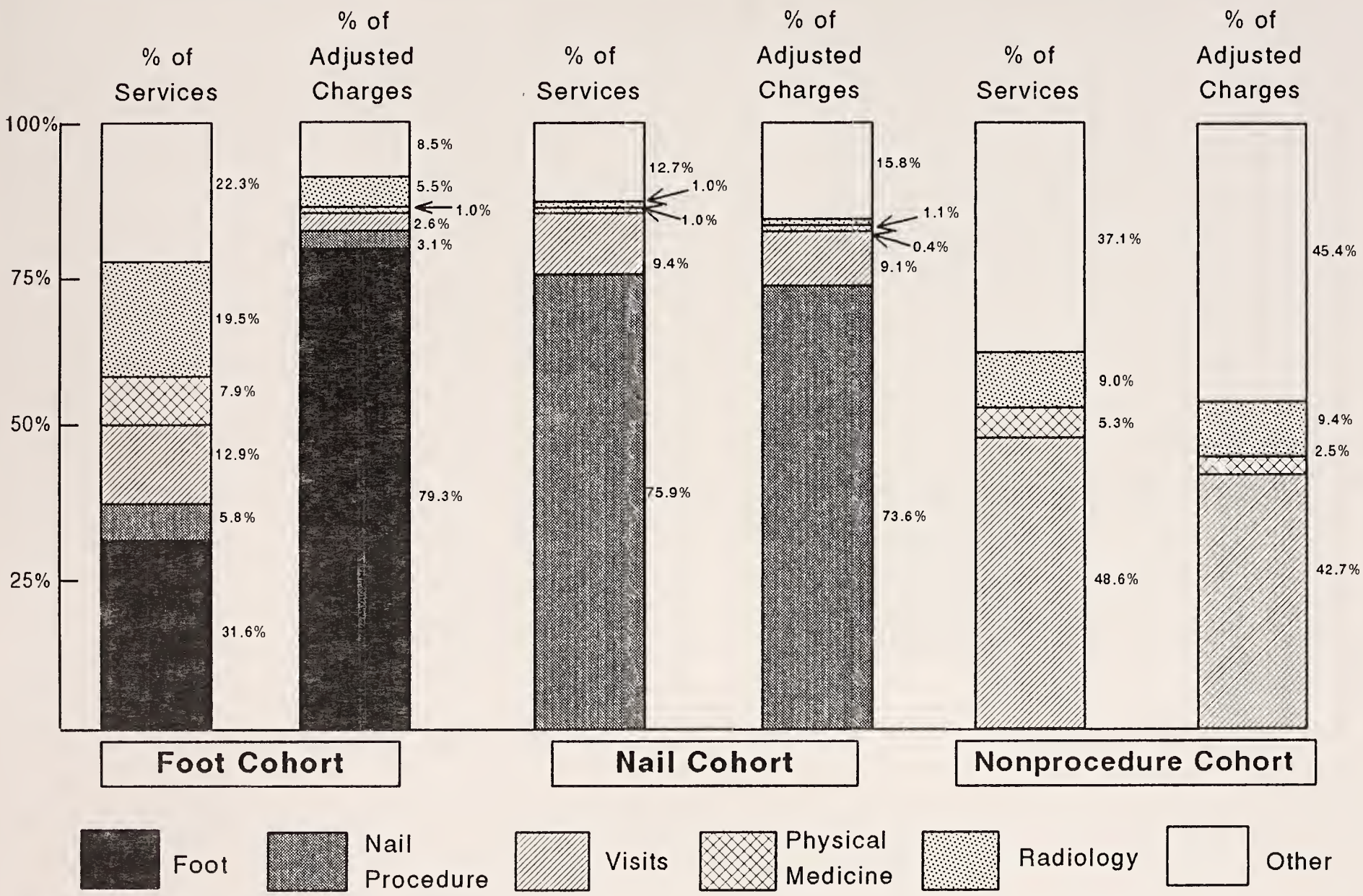
EXHIBIT 4-4

DESCRIPTION OF PODIATRY PACKAGES

	Cohort 1 Foot Procedures	Cohort 2 Nail Procedures	Cohort 3 Other	All Cohorts
Number of patients	4,623	74,123	38,123	116,869
Average adjusted charge/ patient	$756	$98	$106	$127
Average number of services/ patient	7.0	3.7	3.9	3.9
Average number of foot procedures/patient	2.2	0.0	0.0	N/A
Average number of nail procedures/patient	0.4	2.8	0.0	N/A
Average adjusted charge/service	$107	$27	$27	$33
Number of index providers	587	737	790	835
Average number of patients/ provider	7.9	100.6	48.3	140.0
Percent with index providers				
Services	95.4%	95.1%	95.0%	95.1%
Adjusted charges	97.1%	95.0%	94.8%	95.4%
Percent patients with				
One provider	89.4%	92.9%	91.7%	92.4%
One or two providers	99.2%	99.6%	99.3%	99.5%
Percent of providers treating				
1-50 patients	97.8%	56.9%	68.5%	35.1%
51-100 patients	2.0	13.4	18.7	17.5%
101-200 patients	.2	15.2	9.8	25.8%
201-500 patients	0.0	12.0	2.7	18.0%
500+ patients	0.0	2.5	0.3	3.6%
Percent of patients treated by providers treating more than 100 patients	2.3%	80.4%	47.3%	86.0%

Exhibit 4-5

Distribution of Charges and Services Included in Podiatry Package



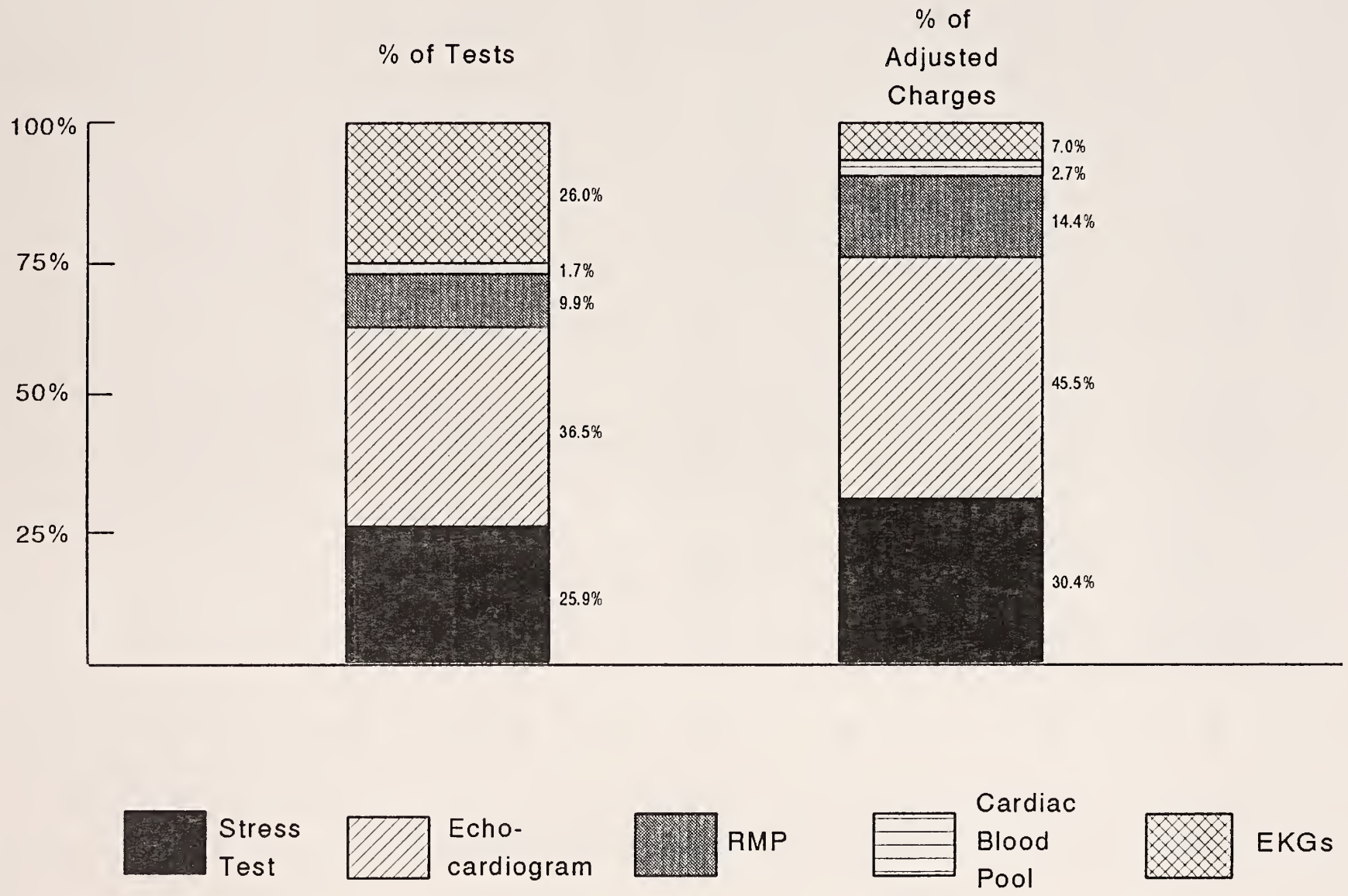
SOURCE: 1988 Part B Data, five states.

EXHIBIT 4-6

DESCRIPTION OF CARDIAC TESTING PACKAGES

Number of patients	18,547
Average adjusted charge/patient	$365
Average number of tests/patient	3.5
Major tests	2.6
EKGs	0.9
Average charge/test	$104
Stress test	$121
Echocardiogram	$135
Myocardial perfusion	$149
Cardiac blood pool	$162
EKGs	$29
Number of index providers	1,702
Average patients/provider	10.9
Percent with index provider	
Services	68.1%
Charges	75.2%
Percent patients with	
One provider	46.8%
One or two providers	82.8%
Percent of providers treating	
1-5 patients	63.7%
6-11 patients	13.1%
11-20 patients	9.9%
more than 20 patients	13.3%

Exhibit 4-7
Distribution of Charges and Services Included in Cardiac Testing



SOURCE: 1988 Part B Data, five states.

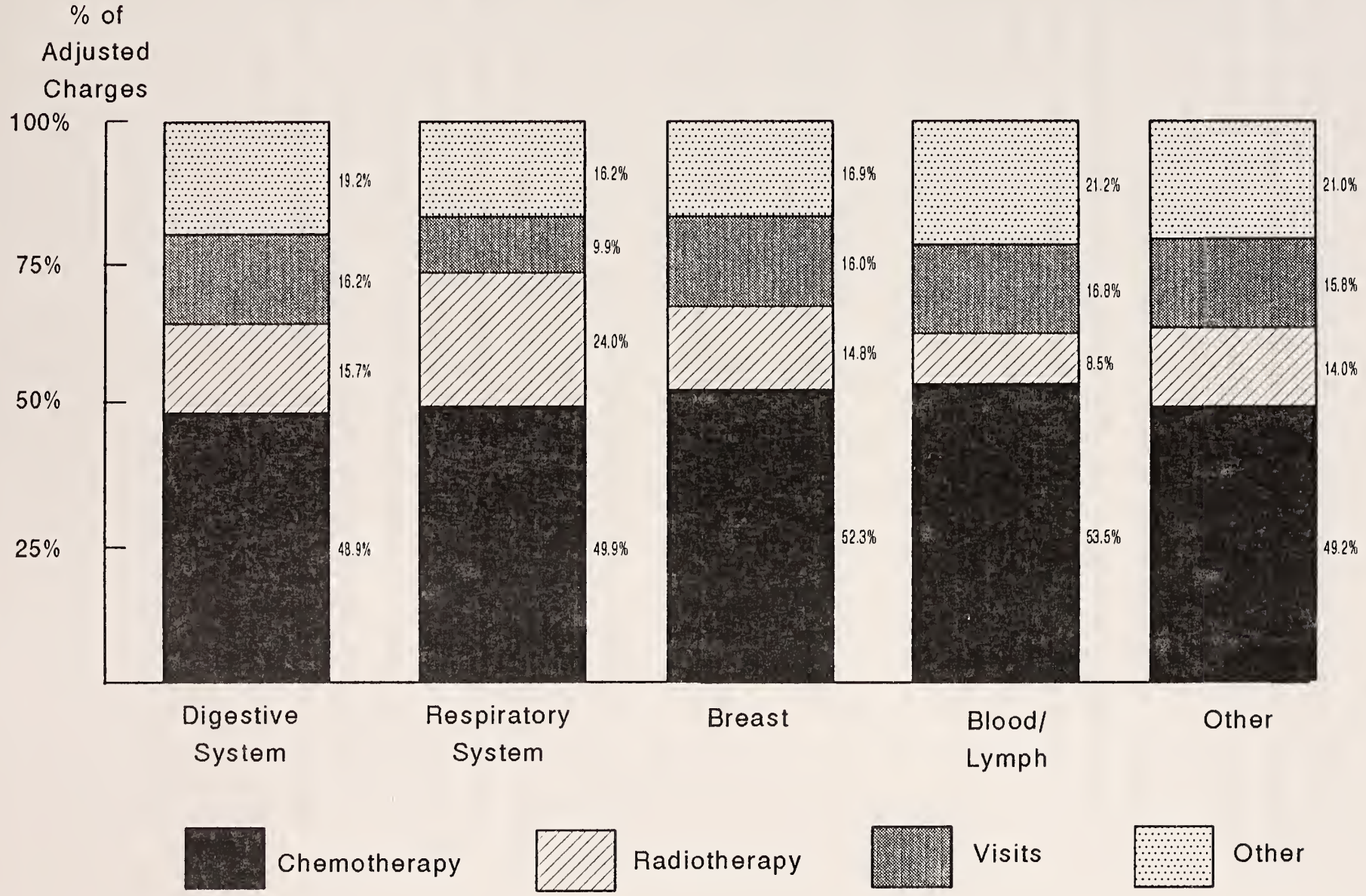
EXHIBIT 4-8

DESCRIPTION OF CANCER TREATMENT PACKAGES

	Digestive System	Respiratory System	Breast	Blood/ Lymph	Other	All Diagnoses
Number of patients	785	455	479	991	1,671	4,384
Average number of months of active treatment	6.0	5.5	6.2	6.8	6.6	6.4
Average adjusted charge/ treatment month	$295	$382	$240	$235	$253	$266
Average number of services/month of active treatment	16.3	15.4	13.4	11.3	13.1	13.5
Average adjusted charge/service	$18.04	$24.83	$17.86	$20.78	$19.30	$19.75
Number of index providers	318	212	223	320	500	759
Average patients/index provider	2.5	2.1	2.1	3.1	3.3	5.8
Percent with index provider						
Services	83.6%	79.9%	87.8%	90.5%	86.1%	86.0%
Charges	77.0%	71.5%	79.6%	85.8%	79.5%	79.4%
Percent patients with						
One provider	75.3%	84.6%	79.3%	83.8%	76.8%	79.0%
One or two providers	93.9%	97.4%	94.8%	96.3%	95.7%	95.6%
Percent of providers treating						
1-5 patients	92.1%	95.8%	93.7%	84.4%	84.0%	73.5%
6-10 patients	5.7	3.7	5.9	12.8	11.2	7.7%
11-20 patients	1.6	0.0	0.4	2.8	3.2	10.2%
more than 20 patients	.6	0.5	0.0	0.0	1.6	6.5%
Percent of patients treated by providers treating more than 20 patients	6.7%	5.7%	0.0%	0.0%	13.2%	39.4%

Exhibit 4-9

Distribution of Charges Included in Cancer Treatement Package



SOURCE: 1988 Part B Data, five states.

5.0 SIMULATING PACKAGE MODEL PAYMENT ALTERNATIVES

In this section, we use actual payment data to simulate the four package models put forward in Section 4. For each of the four models, we simulate the distributional consequences of paying providers on an all-inclusive, single fee basis. We then consider whether or not the projected distributional impacts are reasonably equitable and have sufficient potential to warrant the continued development and testing of outpatient package payment arrangements.

Unfortunately, it is not easy to evaluate or interpret the simulation findings. There are no well-defined, objective criteria for gauging whether the distributional impacts of the various package payment alternatives are equitable and acceptable--acceptable to policy-makers and acceptable to the provider community. We nevertheless suggest that two distributional objectives need to be met:

(1) There should be no "windfall" gains or losses for particular types of patients or providers (i.e., no patient or provider subgroups can be unduly advantaged or disadvantaged as a group).

(2) The dispersion of gains and losses across patients and providers should not be too large. (i.e., large numbers of patients or providers can not be significantly advantaged or disadvantaged by the payment system).

To the extent that these objectives are not met, one confronts three problems or concerns. One, there may not be sufficient homogeneity, in terms of the service frequency or intensity of services included the package. In this case, the **prima facie** validity or integrity of the package model itself may be suspect. Practice variation may reflect provider inefficiency, or it may reflect underlying differences in patient need. If it is the latter, risk pooling on a package basis becomes less tenable. It is extremely difficult, however, to determine whether practice variation is due to practice differences or to case-mix variation. Absent a strong central tendency, there is no mechanism for determining practice standards from claims data alone.

Two, if certain types of patients (e.g., those aged 85 or more) are substantially more or less "profitable," providers will have incentive to seek out the more profitable patient types and deny services to the less profitable. Such provider behavior would not be a desirable outcome.

Three, even if dramatic changes in practice behavior are desired, a practical package payment system may choose to allow for a transitional period of gradual adjustment to changed payment incentives. For various reasons, providers cannot be expected to adapt or modify their practice patterns all at once. Also, policy makers may not have sufficient confidence in the package models to demand an abrupt adjustment in practice behavior. A graduated adjustment process could help to reduce the policy risk.

Our simulation analyses are conceptually straightforward. For illustrative purposes, consider one of our four package models, namely, paying physicians on a package basis for cardiac testing over a six-month interval. For each patient receiving the package, we determine the price-adjusted covered charges or "costs" for cardiac testing--using national average prices to weight service intensity (as discussed in Section 2). We then average the price-adjusted package costs over all patients, and imposing budget neutrality, we take the average cost as the package payment rate. In order to ascertain who wins and who loses under such a payment system, this fixed payment rate is then compared to the price-adjusted costs of package services actually provided to each patient.

The simulations are conducted at two different levels of aggregation. The package models are first simulated at the patient level, using the individual patient as the unit of observation. These analyses tell us whether certain types of patients (e.g., male vs. female, black vs. white, or Medicaid eligible vs. non-Medicaid eligible) would be systematically advantaged or disadvantaged by bundled payment.

Afterwards, the models are simulated at the provider level, aggregating the individual patient experience for each index provider. Although the patient-level simulations provide useful information on distributional impacts, we nevertheless anticipate that the provider-level results have greater policy importance. If, for example, all providers had the same patient distribution, any patient-level inequities would be substantially mitigated

through risk pooling at the provider level. Also, any distributional inequities found at the patient level can be more easily resolved through payment rate adjustments.*

The following section provides additional discussion of how the simulations were conducted, reported and interpreted. Subsequent sections present the simulation results for each of the four package models.

5.1 Analytic Specifications

There were three basic steps involved in simulating alternative package model payment approaches. For each payment alternative, we did the following:

(1) determined the package payment rate(s);

(2) applied the payment rate(s) to individual patients; and

(3) compared the fee-for-service costs to the package payment amounts.

Again, national average prices were used, in lieu of the actual prices applicable to each patient, to calculate the package costs. Such price adjustment eliminates variation related to geographic cost and reimbursement rate differences. Consequently, the gains or losses indicated from our simulations reflect differences in the quantity or intensity of services provided.

For each of the four package models, three different payment approaches are simulated. The first payment alternative uses the five-state average cost of the package as the payment rate. This is our five-state (or global) analog of using a fixed, national average payment rate.

The second payment alternative uses the five-state (or global) average cost after excluding high cost outliers. Outlier trimming offers a potentially important mechanism

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*Both patient- and provider-level results are reported by geographic area (e.g., by state, selected metropolitan area, and urban vs. rural). In general, these patient- and provider-level results are not quite the same. The results vary for the following reason. The patient-level results are aggregated by patient residence, whereas the provider-level results are aggregated by provider location. Thus, to take an example, the patient-level results for Arizona reflect only the experience of beneficiaries living in Arizona; however, the provider-level results reflect also the experience of non-Arizona residents receiving care from Arizona providers. Likewise, beneficiaries living in rural Arizona may go to providers practicing in urban Phoenix.

for limiting the provider risk associated with packaged payment. Since the distribution of patient expense is often highly skewed, the inclusion of high cost patients in a package may result in overpayment for the majority of patients while not substantially reducing losses incurred on the truly high cost patients.

The DRG-based prospective payment system used to reimburse hospital inpatient stays sets aside five percent of reimbursement for outlier payment. The majority of outlier payments go to day outliers, patients whose length of stay exceeds the length-of-stay threshold; and cost outliers represent only 22 percent of outlier cases (Keeler, et al, 1988).* Based on the DRG experience, a two to five percent outlier exclusion appeared reasonable. A two percent outlier exclusion approximates excluding patients whose costs are three or more standard deviations above the mean.

We experimented with a variety of outlier thresholds, e.g., excluding both high and low cost outliers at the second, fifth and tenth percentile levels. However, after excluding the top two percent of the costliest patients, we found that additional outlier exclusions did little to improve simulation risk parameters.

To be consistent, all outlier analyses reported here exclude patients at the 98th percentile and above. That is, if patients were ordered from highest to lowest cost, the top two percent of patients would be excluded in calculating the payment rates and simulating the distributional consequences.**

The third payment alternative uses state-specific average costs, after exclusion of high cost outliers. State-specific rating is essentially a form of experience rating. Ellis and McGuire (1988) have shown that experience rating can substantially improve the apparent fairness of a payment system. State-specific payment rates tend to maintain existing geographic differences in provider practice, even if those differences are inappropriate. As discussed above, however, policy makers may choose to temporarily shelter providers from exceptionally large financial impacts in order to facilitate an orderly transition process.

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*This percentage varies somewhat by year.

**This study does not explicitly address the question of how outliers would be paid. However, we had anticipated that outliers might be paid on a discounted fee basis, albeit subject to intensive peer review on a targetted or other sample basis.

Having only five states, we do not, of course, have a comprehensive test of national versus state-specific payment alternatives. Nevertheless, our five-state and state-specific simulations should give a reasonably dependable indication of the potential for risk reduction implied by using geographic rate adjustments.

The distributional effects of the different package payment alternatives are summarized and compared as follows. First, we report the mean package costs and coefficients of variation (CVs) across various patient and provider categories. The CVs are calculated as the standard deviation of package costs divided by mean package cost, and multiplied by 100. It measures the relative dispersion or variability within each group or subgroup. A lower CV implies greater homogeneity or central tendency with regard to package costs.

Means and CVs across cohorts are weighted by the five-state cohort distribution, rather than the distribution within each category (e.g., state or MSA). This eliminates any differences across groups that are solely due to differences in patient cohort distribution.

For each payment approach, we then simulate the distributional effects of packaged payment, in terms of the percentage gains or losses to various patient and provider groups. The percentage gain/loss for each group of patients is calculated as the package reimbursement rate minus the price-adjusted cost under the present fee-for-service payment system divided by package reimbursement.* For providers, we aggregate experience across each provider's patients to calculate the average percentage gain or loss within each provider grouping.** For each of the three simulations, for each package model, we report the average percentage gains or losses for various groups of patients (e.g., by age and sex groups) and various groups of providers (e.g., by location and specialty). The variability of gains and losses is measured by the standard deviation, as a percentage of the average package

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*Weighted averages use the five-state cohort distribution.

**Calculations are done separately including only patients in a particular cohort, and including all patients for a given provider category.

payment rate. The patient- and provider-level percentile distributions of package costs are also given.*

Sections 5.2 through 5.5 report and evaluate, in turn, the simulation results for each of the four package models--(1) laser eye surgery, (2) podiatric services, (3) cardiac testing, and (4) cancer treatment. Each section also assesses the potential for further development or testing of packaged payment alternatives in its respective area.

5.2 Laser Eye Surgery

This package model includes all services provided by ophthalmologists over a six-month interval after beginning a course of laser eye treatment. It focuses on two types of patients, (1) those with diabetic retinopathy and (2) those with after-cataract sequelae.

5.2.1 Average Package Costs and Coefficients of Variation

In Exhibit 5-1, the average costs and coefficients of variation (CVs) are reported by patient cohort (i.e., separately for diabetic retinopathy and after- cataract patients) and by various geographic, patient and provider subcategories. The weighted average column in this exhibit provides a convenient summary of the overall package cost patterns, weighted by the five-state distribution of the two patient cohorts.

For the entire five-state sample (outliers not excluded), the average package costs are $1,659 and $768, respectively, for the diabetic retinopathy and after-cataract cohorts. In the trimmed sample, package costs are reduced to $1,554 and $715, respectively.

The average package costs for the after-cataract cohort are extraordinarily similar across the five states, the five MSAs, even between urban and rural areas. The average after-cataract expense, for example, varies only from $708 in Georgia to $721 in Kansas. The

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*Since our claims data contained patient addresses but not provider addresses, a provider was assigned to a given location (e.g., urban/rural, state or MSA) if 50 percent or more of the provider's patients came from that location.

expense is somewhat larger for younger beneficiaries, females and non-white patients, and it is considerably larger for Medicaid-eligible patients. Also, it is markedly higher for the higher-volume providers, $732 for providers with 20 or more patients compared to $705 or less for those with fewer patients.

The diabetic retinopathy cohort indicates a different pattern. The geographic differences are large, but the patient or demographic differences are less important. The average diabetic retinopathy expense, for example, varies from $1301 in Washington to $1810 in Connecticut; and it varies from $1290 in Seattle to $1787 in Hartford. On the other hand, there is only a $128 difference between the average costs for those who are or are not Medicaid eligible. But, again, the costs are higher for higher-volume providers.

Despite the manifest cost differences, the diabetic retinopathy versus after-cataract dichotomy accounts for only 14 percent of the variation in package costs across patients. The comparatively smaller percentage of variation explained is, no doubt, largely an artifact of having so few diabetic retinopathy patients. In what follows, we shall focus only on the results for the after- cataract package. In our view, the relative incidence of diabetic retinopathy is simply too low to make packaging worthwhile for that condition.

The CV (or coefficient of variation) is, again, simply the standard deviation divided by the mean, multiplied times 100. Before trimming, the after-cataract patient-level CV in Exhibit 5-1 is 79; after trimming, it is 66. The extent of patient-level variation, however, is surprisingly consistent across the various geographic and patient categories. The patient-level CV, for example, varies only from 61 in Georgia to 69 in Washington.

The provider-level CV reflects the risk-reduction benefits of pooling patient-specific risk at the provider level. Before trimming, the provider-level CV is 26, which is dramatically less than the patient-level CV for this universe (see above). After trimming, the provider-level CV is further reduced to 21. The within-group variation is reasonably consistent across the five states, and between urban and rural areas. However, the provider-level CV varies importantly within the five MSAs, ranging from 17 in Kansas City to 28 in Atlanta. Furthermore, the provider-level CV is dramatically lower for the higher-volume providers, equal to only 14 for providers with 20 or more patients.

5.2.2 Distribution of Gains and Losses on Simulated Package Payment

Patient and provider-level simulation results for laser eye surgery are reported as follows:

(1) Exhibit 5-2: Global Payment Rates, Entire Sample
(2) Exhibit 5-3: Global Payment Rates, Trimmed Sample
(3) Exhibit 5-4: State-Specific Payment Rates, Trimmed Sample

In reviewing the results, we focus initially on Exhibit 5-3, applying global or five-state average payment rates to the trimmed sample. This is the payment alternative which we judge to yield the best results. Afterwards, we compare it to the results in Exhibits 5-2 and 5-4. Here also, we limit our attention to the after-cataract cohort.

The results in Exhibit 5-3a indicate that, with trimming, the global payment alternative would have surprisingly modest distributional impacts on the various geographic and patient subgroups. Across the five states, for example, we project that the after-cataract gain/loss, at the patient level, would vary only from a 0.7 percent loss in Washington to a 1.0 percent gain in Georgia. The MSA results also fall within a markedly constricted range. We project, however, that providers would lose six percent on Medicaid-eligible patients, three percent on non-white patients and four percent on patients under the age of 65. But even these impacts are not large or problematic. They could easily be resolved through adjustment of the payment rates.

Within all patient categories, the gain/loss standard deviations are nevertheless quite large. The standard deviation for the entire trimmed sample is 66 percent; and it does not vary much from that magnitude across the various patient categories. Providers would gain 31 percent or more on a quarter of their patients, and lose 52 percent or more on one patient in ten.

The provider-level results, in Exhibit 5-3b, indicate similarly modest distributional impacts at the provider level. However, high-volume providers would incur, on average, a

two percent loss. The simulated standard deviation is only 21 percent. It is lower in Kansas City, equal to 17 percent; and it is higher in Atlanta, equal to 28 percent. A quarter of the providers are projected to lose seven percent or more, and another quarter are projected to gain 26 percent or more.

The results in Exhibit 5-4, using state-specific rates with the trimmed sample, are strikingly similar to those in Exhibit 5-3. Inasmuch as the state- specific alternative offers no clear advantage over the global approach, we conclude that there is no rationale for making such geographic adjustments.

The results in Exhibit 5-2, applying global rates to the untrimmed sample, indicate somewhat larger distributional impacts. For example, providers would lose five percent on Arizona patients and gain five percent on Connecticut patients. While these geographic impacts are not large, trimming would avoid them altogether. Also, the provider-level standard deviation in Exhibit 5-2 is calculated to be 25 percent larger than it would be using the trimmed sample.

5.2.3 Discussion

There is unquestionably significant potential for package-based payment of laser eye surgery and related services provided to after-cataract patients. The dispersion of gains and losses across providers is not unreasonably high, and the disparities within provider group, especially the high volume providers, are comparatively moderate. Of the three payment alternatives, the global payment approach with trimming shows the greatest promise. There is no indication of a need to differentiate payment rates by state.

On balance, however, we believe that the most promising alternative would be to bundle after-cataract treatment with the cataract procedure itself. Although we did not explicitly investigate that prospect, it is conceptually more attractive than the one that we examined. In particular, bundling after-cataract treatment with the cataract procedure would help to avoid concerns about the inherent ambiguity of clinical thresholds for treatment of cataract sequelae. That decision would then be internalized by the provider.

Since cataract surgery comprises roughly 50 percent of Medicare revenues to ophthalmologists (Joe Escarce, 1989), it seems unlikely that the bundling of laser eye surgery and related services with the cataract procedure could have a substantially adverse distributional impact. The distributional consequences should nevertheless be evaluated. Furthermore, it should be done using diagnostically-coded claims data, in order to more reliably discriminate the services and costs involved in treating after-cataract sequelae.

5.3 Podiatric Services

This package model includes all services provided by a podiatrist to Medicare beneficiaries over a six-month observational interval. The patient universe is subdivided, for purposes of rate setting, into three cohorts, as defined in Section 3.2--(1) a foot cohort, (2) a nail cohort, and (3) a nonprocedure cohort.

5.3.1 Average Package Costs and Coefficients of Variation

In Exhibit 5-5, the average price-adjusted costs for the six-month packages are reported by patient cohort, and by selected geographic, patient and provider categories. This table also shows the patient and provider-level CVs (coefficients of variation), which measure variability within each cohort or category. The weighted average column in Exhibit 5-5 provides a composite measure of podiatric cost differences, summarizing experience across all three patient cohorts. In order to ensure comparability of results, these averages were calculated using a standardized patient distribution, namely, the patient cohort distribution for the entire five-state sample.

For all sample patients, the six-month average cost of podiatric services is $127. After trimming cost outliers (i.e., removing the top two percent most costly patients in each cohort), the average drops to $116. Focusing on the trimmed sample, Foot Cohort patients are considerably more expensive than patients in either the Nail or Nonprocedure Cohorts, $701 compared to $90 and $95, respectively. The similarity in average costs between the Nail and Nonprocedure Cohorts suggests the possibility of combining them into a single cohort for payment purposes.

A simple regression analysis found that our cohort stratification explains 40 percent of the sample variation in patient-level costs. Thus, the cohort designations do quite well in explaining variability in package costs-- although this largely reflects the dramatically higher cost levels in the Foot Cohort.

The state-specific average costs, in the trimmed sample, range from $97 in Connecticut to $135 in Arizona. Likewise, the metropolitan area costs vary from $99 in Hartford to $138 in Phoenix. It seems improbable that patient mix differences explain much or most of these cost differences, especially given the comparative uniformity of experience across other patient categories included in Exhibit 5-5. For example, nonwhite patients cost only nine dollars more than white patients, and Medicaid-eligible patients cost only seven dollars more than noneligibles--and these are the largest differences in cost across patient groups.

The patient-level CVs reported in Exhibit 5-5 nevertheless signal a high level of practice variation within all patient cohorts and categories. The average patient-level CV drops from 93 to 67 after trimming. However, the patient-level CV is never less than 62 in any of the patient groupings; and it is never more than 70.

The provider-level CVs, on the other hand, indicate a different pattern. The average CV drops from 47 to 33 after trimming. The simple average of the provider-level CVs for the five-states is 29; and the average for the five MSAs is 30. This suggests that there is somewhat greater uniformity of provider practice within geographic areas then there is across geographic areas.

The provider-level CV, as expected, is lowest for providers with the largest patient panel. In particular, the provider-level CV is 27 for providers with 500 or more patients, compared to a CV of 36 for providers with 20 to 50 patients.

5.3.2 Distribution of Gains and Losses on Simulated Package Payment

Patient and provider-level simulation results for podiatric services are reported as follows:

(1) Exhibit 5-6: Global Payment Rates, Entire Sample

(2) Exhibit 5-7: Global Payment Rates, Trimmed Sample

(3) Exhibit 5-8: State-Specific Payment Rates, Trimmed Sample

We focus initially on the state-specific results presented in Exhibit 5-8, the payment alternative which we judge to have the greatest potential for near-term implementation. Afterwards, we consider how the results in Exhibits 5-6 and 5-7 are different.

The results in Exhibit 5-8 indicate that a state-specific payment approach does surprisingly well in avoiding undue impacts on any of the patient and provider groups. No patient or provider group loses more than seven percent, and none gain more than eight percent. The distributional impacts by geographic area are extremely moderate. The provider-level experience varies only from a two percent gain in Kansas City to a three percent loss in Phoenix. Furthermore, no meaningful impact is seen across sex, race and Medicaid-eligibility categories.

Nonetheless, there is considerable gain/loss variability within patient groups (see Exhibit 5-8a). The patient-level standard deviation is 65 percent for the entire sample; and it doesn't vary much from that level across the various patient categories. Providers would lose more than 24 percent on one of four patients, and they would gain more than 43 percent on another quarter of their patients.

The provider-level standard deviations (see Exhibit 5-8b) are considerably more encouraging. The overall standard deviation is only 25 percent. Furthermore, it is even lower in several provider categories:

- 20 percent in Arizona;
- 20 and 22 percent, respectively, in Phoenix and Seattle;
- 21 percent in rural areas; and
- 18 percent for providers with 500 or more patients.

One fourth of the providers would lose more than 15 percent, and one-fourth would gain more than 19 percent.

The results using global payment rates (see Exhibits 5-6 and 5-7) indicate substantially different distributional impacts. Applying global payment rates to the entire sample results in substantial gains and losses to various groups of patients and providers. The patient-level results, in Exhibit 5-6a, show that the gain/loss varies from a 21 percent gain in

Connecticut to a 29 percent loss in Georgia, and that it varies from a 17 percent gain in Hartford to a 32 percent loss in Phoenix. Other groups of patients also experience large losses. In particular, providers experience considerable losses on the following groups of patients:

- a 13 percent loss on rural residents;
- a 16 percent loss on nonwhite patients; and
- a six percent loss on Medicaid-eligible patients.

Trimming the sample reduces the losses, but the losses remain sizeable. The patient-level results in Exhibit 5-7a, applying global payment to the trimmed sample, indicate that the gain/loss on the package varies from a 17 percent gain in Connecticut to an 18 percent loss in Georgia; and that it varies from a 16 percent gain in Hartford to a 21 percent loss in Phoenix, as well as a 19 percent loss in Atlanta. Providers would continue to lose on rural residents (12 percent), nonwhite patients (11 percent), and Medicaid-eligible patients (8 percent). The gain/loss experience by beneficiary age category, on the other hand, is not substantively different from that in the state-specific payment model.

The variability of patient and provider-level gain/loss results is greater in both global payment rate simulations. The provider-level standard deviation is 41 percent, applying global payment rates to the entire sample (Exhibit 5-6b), and it falls to 29 percent in applying global rates to the trimmed sample (Exhibit 5-7b)--compared to a standard deviation of 25 percent using state-specific payment rates (Exhibit 5-8b). The patient-level standard deviations, and both the patient and provider-level percentile distributions reflect the same basic pattern, namely, that the state-specific payment alternative involves fewer windfall gains and losses.

5.3.3 Discussion

For the high volume providers, at minimum, we conclude that podiatric services offer reasonable promise for packaged payment. While practice variability is still important, even for providers with 500 or more patients, it seems unlikely that the practice differences could be attributed only to systematic differences in patient need. Furthermore, given the discretionary

and non-critical nature of most podiatric care, podiatric services would seem to be a good candidate for testing whether or not bundled payment leads to more consistent and more appropriate patterns of care.

The state-specific payment alternative is clearly the strongest in terms of its near-term potential for provider acceptance. It scores highly with regard to provider equity, inasmuch as the geographic and other distributional impacts are, on average, comparatively small. On the other hand, we have reservations about the efficiency of a state-specific payment approach, inasmuch as the large geographic variations in podiatric practice may be unwarranted.

The regional disparities in podiatric practice patterns require further investigation. In particular, we recommend that HCFA examine the practice differences and evaluate whether podiatric practice is more or less appropriate in those areas which provide more services. Such a study would probably require review of medical records in addition to claims analysis. Once practice standards have been set, a state-specific payment system could be transitioned to a national-average payment system--namely, one which reflects the appropriate level of service intensity.

Our patient taxonomy (i.e., subdividing patients into foot, nail and nonprocedure cohorts) is admittedly ad hoc. It nevertheless seems to work quite well. We do not, however, wish to preclude alternative approaches to patient stratification; and, indeed, we encourage HCFA to develop and investigate other alternatives. It would be preferable to have a diagnostic- based payment scheme that providers could accept as being clinically meaningful.

5.4 Cardiac Testing

This section describes the results of simulating package-based payment for cardiac testing. Individuals who received at least two major cardiac tests within six months were included in a single cardiac testing cohort. The cardiac-testing package includes all outpatient cardiac tests, including EKG's, provided during a six-month interval.

5.4.1 Average Package Costs and Coefficients of Variation

Exhibit 5-9 shows the overall means and coefficients of variation for the entire sample, and by geographic and demographic subgroups for the trimmed sample. The average cost for the package of cardiac tests is $365. This varies considerably by state, MSA, patient demographics and provider specialty. The average package costs are 24 percent higher in Arizona than in Georgia, and 29 percent higher in Phoenix than in Atlanta, with other states and MSAs in between. Non-white and Medicaid-eligible patients both cost 11 percent less than others. The highest-cost age groups are those 65 years to 79 years of age, with younger and older patients costing less. The variability in practice patterns suggests that there is considerable provider discretion in deciding the intensity of cardiac testing.

Before trimming, the overall patient-level CV is 59; and it falls to 45 after trimming. The provider-level CV is 36; and it drops to 29 after trimming. Clearly, a provider's financial risk can be substantially reduced by aggregating across patients and trimming outliers.

5.4.2 Distribution of Gains and Losses on Simulated Package Payment

The results of simulating all three payment approaches are presented in Exhibit 5-10. The state-specific payment alternative, in the third column, seems to be the preferred payment alternative, in terms of avoiding significant advantage or disadvantage to various patient and provider groups.

In examining the patient-level simulations, in Exhibit 5-10a, the following may be noted:

- Applying global payment (i.e., five-state average) rates to the untrimmed sample, Arizona and Phoenix are big losers-- losing 13 percent and 17 percent, respectively. Trimming does not substantially change this loss experience, but state-specific payment rates would eliminate the Arizona loss (by definition) and reduce the Phoenix loss to only five percent.

- Applying global payment rates to the trimmed sample, providers would gain 13 percent on patients over 85 years. Trimming reduces this gain to ten percent. State-specific payment rates have little additional effect.

- Providers gain an average of 13 percent on both non-white and Medicaid-eligible patients. Trimming reduces the gains to 10 percent on both, and state-specific payment rates further reduce the gains to five and six percent, respectively.

The provider-level gains and losses are similar to the patient-level results, with providers in Phoenix and Arizona losing the most and providers in Atlanta and Georgia gaining the most. Again, state-specific payment rates help to eliminate the disparities in gain/loss experience across MSAs.

The gain/loss percentage does not vary importantly with patient volume. Large volume providers (with 20 or more patients) lose three percent, whereas those seeing fewer patients gain three to six percent. Neither trimming nor state- specific payment rates substantially alters this pattern.

The gain/loss percentage, however, varies substantially across provider specialty. Using global payment rates with the entire sample, neurologists lose 53 percent, while internal medicine and group practices gain 11 percent and 15 percent, respectively. Trimming reduces the neurologists' losses to 29 percent. The gains to internists and group practices are reduced to a lesser extent.* State-specific payment rates further reduce the neurologist loss to 17 percent, but the gain to group practices actually increases.

The variability of gains and losses across providers is a key criterion for assessing the equity of a package payment system. The provider-level standard deviation is 36 percent for the whole sample. It falls to 28 and 27 percent, respectively, in the trimmed and state-specific simulations.

Large volume providers (greater than 20 patients) experience less variability. The standard deviation for this group, using state-specific payment rates, is 24 percent. This compares to a standard deviation of 36 percent for small volume providers (0-5 patients) and 28 to 29 percent for medium size providers (6-20 patients). This pattern indicates some ability for larger providers to diversify financial risk across patients, but the effect is not substantial.**

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*There were only thirteen neurologists in the sample. They treated a total of 449 patients.

**The standard deviation of profitability for neurologists is only 12 percent. Thus, they not only have higher costs for cardiac testing, but they also treat their patients with comparative uniformity.

5.4.3 Discussion

Although the cardiac testing results are not altogether unsatisfactory, we do not believe there is significant potential for reimbursement of cardiac testing on a packaged basis. The variability in clinical practice is clearly significant. The standard deviation, equal to 28 percent in the global trimmed model, is moderately high, though not as high as that for cancer treatment (see below). However, unlike cancer treatment, we see no real opportunities for improving the risk performance with respect to cardiac testing. Even if diagnostic information were available, we doubt that it would be useful for risk adjustment purposes--or, for that matter, that risk adjustment would make much difference.

The problem here seems to be one of inherent variability in the intensity of testing. Before going forward with bundled payment in this area, one must first have a better understanding of the clinical context, including the appropriate indications for and use of cardiac testing. As it is now, we do not know whether providers are doing too much or too little--and, unlike podiatric services, cardiac testing involves potential "life and death" considerations which cannot (or should not) be resolved through a demonstration test.

We recommend that HCFA investigate the availability and applicability of clinical practice guidelines for cardiac testing. Once appropriate guidelines have been identified or developed, they should be evaluated relative to their potential for supporting a packaged payment arrangement. If appropriate, updated simulation analyses would then be conducted, examining the distributional impacts of alternative package and payment definitions.

5.5 Cancer Treatment

The cancer treatment package, is constructed on a monthly capitation- like basis, including all chemotherapy, radiotherapy and related professional services per month of active cancer treatment. Furthermore, the package is subdivided into five cohorts by cancer type--(1) digestive, (2) respiratory, (3) breast, (4) blood/lymph and (5) other.

5.5.1 Average Package Costs and Coefficients of Variation

In Exhibit 5-11, the average costs and CVs per month of active cancer treatment are reported by cancer type and various geographic, patient and provider subcategories. The weighted average column in Exhibit 5-11 provides a convenient summary of the overall package cost patterns, weighted by the five-state distribution of the five types of cancer.

For the entire five-state sample (outliers not excluded), cancer treatment cost varies from an average of $235 per month for blood/lymph cancer to $382 per month for respiratory cancer, with a weighted average of $268 across all cancer types. In the trimmed sample, blood/lymph cancer is the least expensive, $222 per month, and respiratory cancer is the most expensive, $358 per month. However, this pattern is not maintained across all states.

The monthly average treatment cost in the trimmed sample, averaged over all cancer types, is $251. The analogous state-specific averages vary from $218 in Georgia to $280 in Kansas. For the five MSAs, the weighted average monthly cost varies from $209 in Kansas City to $262 in Seattle. Curiously enough, Kansas is the most expensive state and Kansas City (actually located in Missouri, but included in Kansas for analytic purposes) is the least expensive MSA. We do not know, however, whether this pattern reflects different hospital admitting thresholds for cancer patients (inasmuch as a prior hospital stay was required to distinguish cancer type); or, whether otherwise similar cancer patients receive dramatically different outpatient treatment in different parts of the Kansas area. Based on the following, we suspect that both are important factors.

HCFA data (Hospital Data by Geographic Area for Aged Medicare Beneficiaries: Selected Diagnostic Groups, 1986, Health Care Financing Special Report, 1990) indicate that the hospital admission rate for digestive cancer is only slightly higher in Kansas City than in the state of Kansas, 6.6 per 1,000 Medicare beneficiaries versus 6.0 per 1,000, respectively. However, the admission rate for respiratory cancer is substantially higher in Kansas City, 4.7 per 1,000 beneficiaries compared to 3.4 per 1,000 for Kansas. The higher admission rate in Kansas City may suggest that cancer patients admitted in that locale are less acutely ill. If so, one may reasonably expect that their average outpatient treatment costs would also be less.

The data indicate extraordinary variation within cancer type. Indeed, a simple regression found that our five-category cancer typology explains less than two percent of sample variation in the price-adjusted costs per month of active treatment. In the untrimmed sample, patient-level CVs vary from 64 for breast cancer to 98 for digestive cancer; and the weighted average CV is 78. Outlier trimming reduces the average patient-level CV to 63. However, the patient-level CVs are never less than 50 within any of the geographic or other demographic categories.

The provider-level CVs also indicate a high level of variation. In the untrimmed sample, provider-level CVs vary from 49 for blood/lymph cancer to 84 for digestive cancer; and the average provider-level CV is 58. Outlier trimming reduces the average CV to 45. This is higher than the provider-level CVs for four of the five states and for all five MSAs, suggesting that there is somewhat greater unformity of practice within these geographic areas. As anticipated, the provider-level CVs vary indirectly with patient load. Providers with only one to five patients have a CV of 61, but providers with 20 or more patients have a CV of 33.

5.5.2 Distribution of Gains and Losses on Simulated Package Payment

Patient and provider-level simulation results for cancer treatment are reported as follows:

(1) Exhibit 5-12: Global Payment Rates, Entire Sample
(2) Exhibit 5-13: Global Payment Rates, Trimmed Sample
(3) Exhibit 5-14: State-Specific Payment Rates, Trimmed Sample

We focus initially on the results in Exhibit 5-13, applying global payment rates to the trimmed sample, inasmuch as that payment alternative is judged to yield the best results. Afterwards, we consider how results in Exhibits 5-12 and 5-14 are different.

The patient-level simulation results in Exhibit 5-13a substantiate the importance of geographic and demographically-related differences in either case-mix or provider practice patterns, or both. Applying a uniform, five-state average payment rate to the trimmed sample, we find the following:

- The average gain/loss varies from a 13 percent gain in Georgia to an 11 percent loss in Kansas;
- Providers would gain 17 percent on Kansas City residents and 16 percent on Hartford residents, but lose five percent on Seattle residents;
- Those patients aged 65 to 74 are least "profitable" and those aged 75 and older are most "profitable;"
- Providers gain 12 percent on nonwhite patients;
- Providers gain 16 percent on Medicaid-eligible patients; and
- Providers lose on patients whose treatment lasts six months or less, and gain on those whose treatment lasts more than six months.

Within all patient categories, the gain/loss standard deviations are quite high. The standard deviation for the entire trimmed sample is 63 percent, and it varies from 51 percent to 71 percent across the five states. Providers would lose more than 31 percent on one of four patients, and they would gain more than 47 percent on one of four patients.

The results in Exhibit 5-13b indicate that the average provider gain/loss varies from a 12 percent gain in Georgia to a 12 percent loss in Kansas. It varies from an 18 percent gain in Kansas City to a four percent loss in Seattle. These results are basically the same as those from patient-level simulation.

Other provider-level results are as follows. (1) There is no meaningful difference in the gain/loss experience between urban and rural providers. (2) Those providers with the largest volumes of cancer patients lose the most, losing ten percent on revenues. (3) Urologists gain an average of 12 percent, while those in internal medicine lose an average of eight percent.

Even at the provider level, the standard deviations of the gain/loss percentages are large. The average provider-level standard deviation within the trimmed sample is 37 percent. It is as low as 29 percent in Connecticut and Georgia, and as high as 48 percent in Kansas; and it averages 29 percent within the five MSAs. One-fourth of the providers would lose more than 13 percent on their cancer patients, and one-fourth would gain more than 49 percent.

On balance, the two other simulation sets do not indicate dramatically different results. The results in Exhibit 5-12, using global payment rates with the untrimmed sample,

indicate much higher standard deviations. The patient-level standard deviation is 78 percent (compared to 63 percent in the trimmed sample); and the provider-level standard deviation is 54 percent (compared to 37 percent in the trimmed sample). With one significant exception, the projected average percentage gains (or losses) by patient and provider category are either about the same or only moderately larger in absolute value. The exception is patients with one-month episodes of active treatment. The average loss using the entire sample is 29 percent, compared to a loss of only one percent using the trimmed sample. The patient and provider percentile distributions are not much different.

Applying state-specific payment rates to the trimmed sample (Exhibit 5-14) unquestionably changes the distributional impacts, but that payment alternative offers no clear advantage over the global (five-state average) payment rate alternative. For example, Atlanta providers lose eight percent under state-specific payment, compared to a four percent gain under global payment; and Kansas City providers have their gain increased from 18 to 27 percent. Also, the distributional impacts on the infectious disease and unknown specialty categories are considerably changed. However, most other distributional parameters are rarely changed by more than a few percentage points. Furthermore, neither the standard deviations nor the percentile distributions of the gain/loss percentages indicate that state-specific payment meaningfully reduces patient or provider risk.

5.5.3 Discussion

The results for our cancer treatment model, as we have defined it, are not encouraging. The level of risk implied, even for providers with larger patient panels, is probably unacceptable and potentially inequitable. Our diagnostic classification of cancer types is simply not adequate to control for the underlying differences in patient treatment requirements.

The basic concept of capitating cancer treatment nevertheless remains attractive and promising--and we recommend that the prospect receive further attention. In particular, we recommend that HCFA use diagnostically-coded claims data to conduct a more focused study on the epidemiology and natural history of cancer treatment. This study should identify

cancer patients at time of first diagnosis and then follow their utilization and costs for several years.

We further recommend that HCFA investigate the feasibility of using the National Cancer Institute's cancer staging methodology for risk-adjusting package payment rates. Cancer stage, however, is not currently included in the ICD-9-CM diagnostic coding structure. Thus, a study of this type would probably require reference to medical records.*

5.6 Interpreting the Simulation Findings

Again, there are no absolute standards for gauging whether or not the distributional and risk parameters found for the four package models are acceptable--and whether or not our results support the further exploration of outpatient packaging opportunities. On the other hand, in reviewing and interpreting the results, Medicare's Prospective Payment System (PPS) offers a useful point of reference. DRG-based payment for hospitalization, after all, is the leading example of a packaged payment system that has been accepted (albeit reluctantly) by a provider community. Thus, it is instructive to ask how well our four package models compare to this practical standard, even though the situation is not altogether analogous. In particular, PPS involves packaged payment of large institutional providers whereas our package models would involve payment of individual physicians or physician groups, entities which have much less financial capacity to assume risk.

The within-DRG variation in cost across patients is surprisingly high. Carter and Melnick (1990) examined Medicare discharges during a 60-day interval at 105 hospitals and calculated the coefficient of variation of cost per stay for 24 DRGs. The patient-level CVs ranged from a low of 66 for DRG 106 (coronary bypass with cardiac catherization) to a high of 136 for DRG 182 (esophagitis/gastroenteritis and miscellaneous digestive disorders). For 14 DRGs, Lee, Ellis and Merrill (1992) similarly analyzed all Medicare admissions for one year in five states--the same five states as we have used in this analysis. They found a similar pattern of cost variation across patients.

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*It does not appear that the National Cancer Institute's SEER Program would provide the requisite information for such a study.

Patient-level CVs varied from a low of 47 for DRG 209 (major joint and limb reattachment procedures) to a high of 123 for DRG 236 (fractures of hip and pelvis).

By comparison, the patient-level CVs for our four package models, using the untrimmed sample, were as follows: laser eye surgery, 79; podiatric services, 93; cardiac testing, 59; and cancer treatment, 78. After trimming the high-cost outliers, these patient-level CVs dropped to the following levels: laser eye surgery, 66; podiatric services, 67; cardiac testing, 45; cancer treatment, 63. Thus, generally speaking, the patient-level CVs for the four package models are in the same ballpark as those for DRG-based packaging.

Of greater importance however is the extent to which patient-level risk can be reduced through pooling at the provider level. In particular, Lee, Ellis and Merrill found that hospital-level CVs varied from 22 for DRG 209 (major joint and limb reattachment procedures) to 54 for DRG 429 (organic disturbances and mental retardation). The weighted-average CV for the 14 DRGs examined in that study was 29. By comparison, the CVs across all cohorts within our four package models, using the trimmed sample, were as follows: laser eye surgery, 22; podiatric services, 33; cardiac testing, 28; and cancer treatment, 47. This comparison is not fully appropriate, however, inasmuch as hospitals do not contract on an individual DRG basis. Hospitals pool risk across DRGs as well as within DRG.

Ellis and McGuire (1988), using a 10 percent hospital sample, calculated that the standard deviation of Medicare "profitability" under prospective payment would be approximately 16 percent, using a cost-based methodology for trimming outliers. This compares to the following estimates for the four package models, after trimming outliers: laser eye surgery, 23 percent; podiatric services, 25 percent; cardiac testing, 27 percent; and cancer treatment, 37 percent.

The above comparisons suggest that the levels of provider risk implied by the four package models are certainly no less than that entailed by hospital prospective payment. The risk levels are higher for all four outpatient packages, particularly the cancer treatment package which involves more than twice the profitability risk.

These comparisons focus on provider risk for the entire universe of sample providers. If, however, we consider only those providers with large package volumes, the standard

deviations of profitability drop to somewhat more acceptable levels. The standard deviations for the highest volume providers were as follows: laser eye surgery, 14 percent; podiatric services, 18 percent; cardiac testing, 26 percent; and cancer treatment, 31 percent. Clearly, large-volume providers would be stronger candidates for initial implementation of any outpatient packaging arrangement.

Our simulation findings clearly signal that both laser eye surgery and podiatric services have greater bundling potential than either cardiac testing or cancer treatment. On the other hand, as we have already seen, the package models can not be evaluated merely on the basis of their distributional and risk parameters. A variety of additional criteria, such as clinical and administrative factors, are also important. Indeed, as discussed above (but also summarized below), we believe that cancer treatment actually has greater long-run potential for bundled payment than cardiac testing, even though the empirical results suggest otherwise.

Exhibit 5-1

Laser Eye Treatment Packages

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION

	Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
	ENTIRE SAMPLE (INCLUDING OUTLIERS)		
ALL FIVE STATES			
Mean	1658.7	767.5	865.7
Patient CV	71.4	79.4	78.5
Provider CV	37.1	25.8	27.1
	TRIMMED SAMPLE (EXCLUDING OUTLIERS)		
ALL FIVE STATES			
Mean	1554.1	715.5	807.9
Patient CV	58.6	66.4	65.5
Provider CV	30.5	20.9	21.9
INDIVIDUAL STATES			
Arizona			
Mean	1552.5	715.7	808.0
Patient CV	66.1	67.5	67.4
Provider CV	32.3	18.8	20.3
Connecticut			
Mean	1809.7	712.0	833.0
Patient CV	52.1	63.0	61.8
Provider CV	22.1	22.7	22.7
Georgia			
Mean	1472.4	708.1	792.4
Patient CV	59.6	61.0	60.8
Provider CV	32.4	22.1	23.2
Kansas			
Mean	1556.2	721.4	813.4
Patient CV	54.5	70.4	68.7
Provider CV	27.8	19.2	20.1
Washington			
Mean	1301.0	720.2	784.2
Patient CV	58.1	68.8	67.6
Provider CV	31.7	22.4	23.4
URBANIZATION			
Urban			
Mean	1535.4	711.1	801.9
Patient CV	57.9	66.3	65.4
Provider CV	30.3	20.9	22.0
Rural			
Mean	1625.1	727.8	826.7
Patient CV	60.7	66.7	66.1
Provider CV	30.3	20.7	21.8
SELECTED MSAs			
Phoenix			
Mean	1529.3	716.7	806.3
Patient CV	62.1	67.7	67.1
Provider CV	31.3	18.9	20.2
Hartford			
Mean	1786.8	704.2	823.6
Patient CV	51.4	61.6	60.5
Provider CV	26.2	22.8	23.2

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
Atlanta			
Mean	1503.4	712.4	799.5
Patient CV	61.1	65.7	65.2
Provider CV	33.4	28.2	28.8
Kansas City			
Mean	1307.9	707.9	774.0
Patient CV	56.2	67.1	65.9
Provider CV	16.7	16.9	16.9
Seattle			
Mean	1289.8	711.0	774.8
Patient CV	54.6	67.4	66.0
Provider CV	32.3	21.6	22.8
AGE			
Under 65			
Mean	1610.1	743.4	838.9
Patient CV	56.8	66.6	65.5
65-69			
Mean	1587.6	727.0	821.9
Patient CV	61.4	68.4	67.6
70-74			
Mean	1479.5	733.1	815.4
Patient CV	55.7	67.7	66.4
75-79			
Mean	1570.6	713.2	807.7
Patient CV	61.1	65.7	65.2
80-84			
Mean	1480.0	702.9	788.5
Patient CV	50.4	64.8	63.3
85+			
Mean	1735.7	696.6	811.2
Patient CV	64.2	65.7	65.5
SEX			
Male			
Mean	1595.1	704.4	802.5
Patient CV	56.0	66.5	65.4
Female			
Mean	1530.4	720.1	809.5
Patient CV	60.2	66.3	65.7
RACE			
White			
Mean	1545.7	714.4	806.0
Patient CV	57.8	66.7	65.7
Non-white			
Mean	1598.3	734.7	829.9
Patient CV	62.7	61.1	61.3

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
MEDICAID ELIGIBILITY			
Not Eligible			
Mean	1541.5	712.0	803.4
Patient CV	58.1	66.6	65.6
Eligible			
Mean	1669.1	759.0	859.3
Patient CV	62.3	64.3	64.1
NUMBER OF PATIENTS			
1-5 Patients			
Mean	1560.5	678.1	886.7
Provider CV	47.5	43.4	43.9
6-10 Patients			
Mean	1547.0	704.5	903.6
Provider CV	36.0	26.8	27.8
11-20 Patients			
Mean	1410.1	690.8	860.8
Provider CV	27.2	20.3	21.1
20+ Patients			
Mean	1644.1	731.8	947.4
Provider CV	22.2	13.5	14.4

Source: 1988 Medicare Part B data, five states.

Exhibit 5-2a

Laser Eye Treatment Packages

PATIENT-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATES, ENTIRE SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
ALL	0.00 71.35	0.00 79.40	0.00 78.51
GEOGRAPHIC CATEGORIES			
State			
Arizona	-9.01 94.33	-5.25 92.14	-5.67 92.38
Connecticut	-15.86 71.41	5.19 69.81	-2.87 69.99
Georgia	4.07 73.90	2.41 69.56	2.59 70.04
Kansas	4.94 54.01	0.93 77.45	1.37 74.87
Washington	21.57 45.53	0.59 78.31	2.90 74.69
Urbanization			
Urban	0.06 73.21	-0.24 79.83	-0.21 79.10
Rural	-0.49 64.39	0.60 78.35	0.48 76.81
Selected MSAs			
Phoenix	-14.54 105.36	-6.03 91.24	-6.96 92.80
Hartford	-18.71 78.44	5.77 74.97	3.07 75.35
Atlanta	0.49 83.85	-0.71 78.30	-0.58 78.91
Kansas City	21.15 44.29	1.09 76.50	3.30 72.95
Seattle	22.24 42.44	0.58 78.82	2.97 74.80
PATIENT DEMOGRAPHICS			
Age			
Under 65	-16.36 97.49	-4.41 80.67	-5.73 82.52
65-69	-1.97 75.55	-3.63 90.11	-3.45 88.50
70-74	4.27 64.24	-2.98 82.05	-2.18 80.09
75-79	2.88 65.73	0.28 76.65	0.57 75.45
80-84	10.77 45.01	2.98 75.61	3.84 72.24
85+	-4.65 67.21	3.76 74.28	2.83 73.50
Sex			
Male	-3.90 74.75	1.12 81.33	0.57 80.61
Female	2.26 69.26	-0.47 78.57	-0.17 77.55

PATIENT LEVEL, GLOBAL PAYMENT RATES, ENTIRE SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
PATIENT DEMOGRAPHICS CONT'D			
Race			
White	1.96	0.56	0.71
	67.21	78.84	77.56
Non-White	-10.06	-9.79	-9.82
	89.21	88.13	88.25
Medicaid Eligiblity			
Not Eligible	1.18	0.77	0.82
	69.52	78.81	77.79
Eligible	-10.63	-9.50	-9.62
	85.76	85.77	85.77
Percentile Gain/Loss			
Lowest value	-542.10	-1312.20	-1227.30
1st Percentile	-277.32	-296.93	-294.77
5th Percentile	-133.63	-204.53	-196.71
10th Percentile	-88.40	-60.84	-63.88
25th Percentile	-15.56	16.06	12.58
50th Percentile	18.00	31.79	30.27
75th Percentile	50.19	35.71	37.30
90th Percentile	52.25	35.71	37.53
95th Percentile	53.27	35.71	37.64
99th Percentile	53.27	37.34	39.10
Highest Value	62.39	62.71	62.68

Source: 1988 Medicare Part B data, five states.

Exhibit 5-2b

Laser Eye Treatment Package

PROVIDER-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATES, ENTIRE SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	All Patients
ALL	0.00	0.00	0.00
	37.12	25.81	28.14
GEOGRAPHIC CATEGORIES			
State			
Arizona	-8.91	-5.21	-5.81
	40.78	27.38	29.63
Connecticut	-15.86	4.92	-2.90
	35.95	23.92	28.73
Georgia	4.07	2.46	2.75
	42.12	25.29	29.18
Kansas	4.91	0.93	1.90
	26.84	23.21	24.17
Washington	21.10	0.63	4.15
	25.00	26.33	26.65
Urbanization			
Urban	0.39	-0.11	0.00
	38.32	26.14	28.73
Rural	-1.81	0.44	0.01
	30.83	24.41	25.46
Selected MSAs			
Phoenix	-15.28	-5.95	-7.44
	40.08	26.46	28.58
Hartford	-18.34	4.08	-4.40
	46.20	26.15	34.08
Atlanta	4.22	-0.25	0.85
	46.80	29.70	36.39
Kansas City	20.59	-0.37	5.37
	13.25	25.60	24.76
Seattle	24.96	2.72	5.98
	24.22	27.44	28.57
Number of Patients			
1-5 Patients	-0.88	7.91	5.36
	53.51	44.03	47.61
6-10 Patients	-2.72	5.67	3.91
	44.87	26.24	33.18
11-20 Patients	10.89	5.47	6.93
	34.95	25.30	22.50
20+ Patients	-4.90	-4.30	-4.41
	27.99	21.12	22.67
Percentile Gain/Loss			
Lowest value	-306.83	-384.96	-268.42
1st Percentile	-208.59	-209.18	-200.68
5th Percentile	-97.18	-64.78	-63.51
10th Percentile	-67.69	-33.89	-33.85
25th Percentile	-18.03	-6.84	-7.28
50th Percentile	9.94	13.53	11.78
75th Percentile	41.92	30.64	30.17
90th Percentile	51.76	35.04	35.71
95th Percentile	52.72	35.71	35.71
99th Percentile	53.33	35.71	50.80
Highest Value	56.28	51.31	53.27

Source: 1988 Medicare Part B data, five states.

Exhibit 5-3a

Laser Eye Treatment Package

PATIENT-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
ALL	0.00	0.00	0.00
	58.61	66.40	65.54
GEOGRAPHIC CATEGORIES			
State			
Arizona	0.10	-0.04	-0.02
	66.00	67.54	67.37
Connecticut	-16.45	0.48	-1.38
	60.70	62.64	62.43
Georgia	5.26	1.03	1.49
	56.49	60.33	59.91
Kansas	-0.14	-0.83	-0.75
	54.52	71.02	69.20
Washington	16.29	-0.66	1.21
	48.59	69.28	67.00
Urbanization			
Urban	1.20	0.62	0.07
	57.18	65.88	64.92
Rural	-4.57	-1.73	-2.04
	63.46	67.89	67.40
Selected MSAs			
Phoenix	1.60	-0.18	0.02
	61.14	67.78	67.05
Hartford	-14.98	1.57	-0.25
	59.07	60.62	60.45
Atlanta	3.26	0.44	0.75
	59.07	65.41	64.72
Kansas City	15.84	1.06	2.69
	47.27	66.43	64.31
Seattle	17.01	0.63	2.43
	45.29	66.99	64.60
PATIENT DEMOGRAPHICS			
Age			
Under 65	-3.61	-3.90	-3.87
	58.83	69.19	68.05
65-69	-2.15	-1.61	-1.67
	62.72	69.47	68.73
70-74	4.80	-2.47	-1.67
	53.05	69.37	67.57
75-79	-1.06	0.31	0.16
	61.76	65.49	65.08
80-84	4.77	1.76	2.09
	48.04	63.70	61.97
85+	-11.69	2.63	1.05
	71.74	63.93	64.79
Sex			
Male	-2.64	1.55	1.09
	57.49	65.51	64.63
Female	1.52	-0.65	-0.41
	59.24	66.76	65.93

PATIENT LEVEL, GLOBAL PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After–Cataract	Weighted Average
PATIENT DEMOGRAPHICS CONT'D			
Race			
White	0.54	0.15	0.19
	57.47	66.59	65.59
Non-White	-2.85	-2.69	-2.70
	64.44	62.78	62.96
Medicaid Eligiblity			
Not Eligible	0.81	0.49	0.52
	57.62	66.23	65.28
Eligible	-7.40	-6.08	-6.23
	66.88	68.25	68.10
Percentile Gain/Loss			
Lowest value	-211.22	-283.38	-275.43
1st Percentile	-202.86	-258.63	-252.49
5th Percentile	-117.62	-209.60	-199.46
10th Percentile	-89.86	-51.80	-56.00
25th Percentile	-16.71	12.85	9.59
50th Percentile	22.18	26.83	26.32
75th Percentile	46.89	31.03	32.78
90th Percentile	49.04	31.03	33.02
95th Percentile	50.13	31.03	33.14
99th Percentile	50.13	33.11	34.98
Highest Value	59.86	60.00	59.98

Source: 1988 Medicare Part B data, five states.

Exhibit 5-3b

Laser Eye Treatment Package

PROVIDER-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	All Patients
ALL	0.00	0.00	0.00
	30.47	20.89	22.83
GEOGRAPHIC CATEGORIES			
State			
Arizona	0.49	0.00	0.08
	32.16	18.83	20.71
Connecticut	-16.45	0.21	-6.00
	25.75	22.68	24.25
Georgia	5.26	1.08	1.83
	30.68	21.84	23.61
Kansas	-0.18	-0.84	-0.67
	27.83	19.31	22.08
Washington	15.79	-0.62	2.25
	26.69	22.54	23.18
Urbanization			
Urban	1.54	0.16	0.45
	29.81	20.90	22.56
Rural	-7.06	-0.64	-1.90
	32.39	20.84	23.83
Selected MSAs			
Phoenix	-1.77	0.00	-0.28
	31.85	18.86	18.94
Hartford	-14.68	-0.17	-5.56
	30.00	22.83	25.63
Atlanta	6.38	-0.03	1.55
	31.29	28.23	29.18
Kansas City	15.25	-0.58	3.84
	14.14	17.01	17.94
Seattle	19.90	1.64	4.37
	25.85	21.24	23.62
Number of Patients			
1-5 Patients	-0.42	5.22	3.61
	47.71	41.14	42.74
6-10 Patients	0.45	1.54	1.32
	35.85	26.38	27.85
11-20 Patients	9.27	3.44	5.11
	24.71	19.63	18.27
20+ Patients	-5.79	-2.28	-2.89
	23.4875	13.7583	16.39
Percentile Gain/Loss			
Lowest value	-136.91	-270.95	-270.95
1st Percentile	-134.83	-212.04	-202.83
5th Percentile	-99.49	-48.35	-48.91
10th Percentile	-63.61	-31.89	-32.88
25th Percentile	-19.69	-7.27	-8.56
50th Percentile	9.05	11.12	8.81
75th Percentile	38.09	26.02	25.41
90th Percentile	48.54	30.42	31.03
95th Percentile	49.61	31.03	31.03
99th Percentile	50.26	31.03	47.44
Highest Value	53.34	47.77	50.13

Source: 1988 Medicare Part B data, five states.

Exhibit 5-4a

Laser Eye Treatment Package

PATIENT-LEVEL SIMULATION RESULTS- STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
ALL	0.00	0.00	0.00
	57.67	66.39	65.43
GEOGRAPHIC CATEGORIES			
State			
Arizona	0.00	0.00	0.00
	66.07	67.52	67.36
Connecticut	0.00	0.00	0.00
	52.12	62.95	61.75
Georgia	0.00	0.00	0.00
	59.62	60.96	60.81
Kansas	0.00	0.00	0.00
	54.45	70.44	68.67
Washington	0.00	0.00	0.00
	58.05	68.83	67.64
Urbanization			
Urban	2.24	0.65	0.83
	55.38	65.85	64.69
Rural	-8.69	-1.84	-2.59
	65.37	67.96	67.67
Selected MSAs			
Phoenix	1.50	-0.14	0.04
	61.20	67.76	67.04
Hartford	1.26	1.09	1.11
	50.72	60.91	59.79
Atlanta	-2.10	-0.60	-0.77
	62.35	66.09	65.68
Kansas City	15.96	1.87	3.43
	47.20	65.88	63.82
Seattle	0.86	1.28	1.24
	54.11	66.55	65.18
PATIENT DEMOGRAPHICS			
Age			
Under 65	-4.82	-4.17	-4.24
	58.35	69.36	68.15
65-69	-2.16	-1.61	-1.67
	60.96	69.47	68.53
70-74	5.09	-2.54	-1.70
	52.80	69.42	67.59
75-79	-1.45	0.29	0.10
	60.80	65.50	64.98
80-84	6.21	1.81	2.30
	46.53	63.64	61.75
85+	-12.85	2.74	1.02
	72.33	63.86	64.80
Sex			
Male	-2.30	1.58	1.15
	56.39	65.48	64.48
Female	1.33	-0.66	-0.44
	58.41	66.77	65.85

PATIENT LEVEL, STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	Weighted Average
PATIENT DEMOGRAPHICS CONT'D			
Race			
White	0.95	0.17	0.26
	56.16	66.57	65.42
Non-White	-5.18	-3.16	-3.38
	65.42	63.05	63.31
Medicaid Eligiblity			
Not Eligible	1.14	0.52	0.58
	56.40	66.20	65.12
Eligible	-10.74	-6.47	-6.94
	68.23	68.53	68.50
Percentile Gain/Loss			
Lowest value	-265.86	-287.37	-285.00
1st Percentile	-202.55	-256.74	-250.77
5th Percentile	-119.02	-209.24	-199.30
10th Percentile	-84.51	-52.32	-55.86
25th Percentile	-23.72	12.70	8.68
50th Percentile	22.18	26.63	26.14
75th Percentile	44.65	31.06	32.56
90th Percentile	48.66	31.49	33.38
95th Percentile	50.20	31.60	33.65
99th Percentile	57.17	33.66	36.25
Highest Value	57.63	59.58	59.37

Source: 1988 Medicare Part B data, five states.

Exhibit 5-4b

Laser Eye Treatment Package

PROVIDER-LEVEL SIMULATION RESULTS- STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort		
	Diabetic Retinopathy	After-Cataract	All Patients
ALL	0.00	0.00	0.00
	28.66	20.88	21.87
GEOGRAPHIC CATEGORIES			
State			
Arizona	0.00	0.00	0.00
	32.32	18.83	20.72
Connecticut	0.00	0.00	0.00
	22.11	22.72	19.62
Georgia	0.00	0.00	0.00
	32.38	22.08	23.87
Kansas	0.00	0.00	0.00
	27.78	19.15	21.94
Washington	0.00	0.00	0.00
	31.69	22.40	22.29
Urbanization			
Urban	2.21	0.19	0.63
	27.54	20.88	21.42
Rural	-10.52	-0.77	-2.64
	31.57	20.85	23.54
Selected MSAs			
Phoenix	-2.28	-0.01	-0.36
	32.01	18.86	18.95
Hartford	1.52	-0.38	0.40
	25.76	22.87	21.04
Atlanta	1.19	-1.12	-0.57
	33.03	28.54	29.63
Kansas City	15.40	0.26	4.46
	14.11	16.87	17.77
Seattle	4.88	2.25	2.58
	30.70	21.11	22.90
Number of Patients			
1-5 Patients	-6.22	5.13	2.00
	48.02	41.17	42.57
6-10 Patients	1.01	1.38	1.30
	32.68	26.39	26.71
11-20 Patients	9.73	3.44	5.25
	23.29	19.52	17.56
20+ Patients	-4.73	-2.22	-2.66
	21.54	13.81	15.19
Percentile Gain/Loss			
Lowest value	-138.08	-274.99	-274.99
1st Percentile	-135.99	-211.46	-201.27
5th Percentile	-105.10	-48.85	-47.46
10th Percentile	-71.35	-32.30	-32.20
25th Percentile	-22.60	-7.26	-8.52
50th Percentile	7.55	11.27	7.87
75th Percentile	34.19	25.98	25.25
90th Percentile	45.18	30.28	30.28
95th Percentile	47.78	30.89	31.46
99th Percentile	57.17	31.60	41.66
Highest Value	57.17	47.20	57.17

Source: 1988 Medicare Part B data, five states.

Exhibit 5-5
Podiatric Services

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION

	Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
		ENTIRE SAMPLE (INCLUDING OUTLIERS)		
ALL FIVE STATES				
Mean	755.8	98.3	105.7	126.7
Patient CV	82.5	91.0	98.7	93.2
Provider CV	39.5	50.6	39.9	46.7
		TRIMMED SAMPLE (EXCLUDING OUTLIERS)		
ALL FIVE STATES				
Mean	701.1	89.8	95.1	115.7
Patient CV	68.6	68.2	64.3	66.9
Provider CV	32.8	36.6	26.0	33.0
INDIVIDUAL STATES				
Arizona				
Mean	782.9	111.9	102.0	135.2
Patient CV	65.1	70.1	66.8	68.8
Provider CV	24.0	41.7	22.2	34.6
Connecticut				
Mean	611.8	71.2	85.3	97.2
Patient CV	69.0	64.5	60.7	63.5
Provider CV	37.2	27.3	26.0	27.2
Georgia				
Mean	676.7	110.1	117.5	134.9
Patient CV	66.1	63.5	61.9	63.1
Provider CV	36.6	30.6	21.4	27.8
Kansas				
Mean	663.2	90.8	89.9	113.2
Patient CV	72.5	61.6	62.0	62.1
Provider CV	33.4	27.9	25.7	27.4
Washington				
Mean	715.8	92.7	90.3	116.5
Patient CV	69.2	65.6	61.6	64.5
Provider CV	32.9	31.7	22.3	28.7
URBANIZATION				
Urban				
Mean	706.9	86.0	94.3	113.3
Patient CV	68.8	69.0	64.1	67.4
Provider CV	33.1	36.5	26.2	33.0
Rural				
Mean	680.1	105.8	98.7	126.2
Patient CV	67.9	62.8	64.9	63.7
Provider CV	29.9	29.5	24.3	27.8
SELECTED MSAs				
Phoenix				
Mean	791.1	112.6	106.9	137.6
Patient CV	66.6	70.9	67.8	69.7
Provider CV	23.2	42.4	21.7	34.9
Hartford				
Mean	635.2	71.2	87.2	98.7
Patient CV	72.2	67.0	59.6	64.8
Provider CV	39.8	33.4	29.0	32.2

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
Atlanta				
Mean	699.2	108.2	115.0	133.8
Patient CV	65.2	65.0	64.0	64.7
Provider CV	40.7	33.0	22.4	29.8
Kansas City				
Mean	672.2	85.7	89.6	110.2
Patient CV	68.6	65.3	56.5	62.6
Provider CV	31.1	29.9	24.6	28.2
Seattle				
Mean	699.1	87.9	98.3	115.5
Patient CV	67.6	66.6	63.9	65.8
Provider CV	37.5	26.1	21.8	25.1
AGE				
Under 65				
Mean	772.4	96.9	103.8	125.8
Patient CV	70.5	69.8	65.3	68.4
65-69				
Mean	743.3	97.0	102.0	124.2
Patient CV	67.7	69.6	64.7	67.9
70-74				
Mean	719.4	92.2	97.7	118.8
Patient CV	65.0	69.0	64.8	67.5
75-79				
Mean	669.9	90.4	94.1	114.6
Patient CV	69.0	68.2	63.3	66.7
80-84				
Mean	623.8	87.6	90.1	109.6
Patient CV	71.5	67.5	63.5	66.3
85+				
Mean	550.3	84.0	83.8	102.4
Patient CV	74.7	65.5	60.1	64.1
SEX				
Male				
Mean	647.3	89.1	97.6	114.0
Patient CV	68.5	69.0	65.2	67.7
Female				
Mean	713.6	90.0	94.2	116.0
Patient CV	68.5	67.9	63.9	66.7
RACE				
White				
Mean	705.3	88.5	94.4	114.8
Patient CV	68.5	68.2	64.3	67.0
Non-white				
Mean	655.5	100.5	105.8	124.2
Patient CV	69.5	66.6	62.8	65.4

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
Medicaid Elibility				
Not Eligible				
Mean	706.6	86.0	94.9	113.5
Patient CV	68.3	70.0	64.4	68.1
Eligible				
Mean	644.3	99.8	97.8	120.7
Patient CV	71.6	62.8	63.7	63.4
Number of Patients				
1-5 Patients				
Mean	730.6	99.7	90.5	121.7
Provider CV	51.8	62.4	45.6	56.5
6-10 Patients				
Mean	730.9	103.1	94.6	125.2
Provider CV	59.2	51.6	34.3	46.3
11-20 Patients				
Mean	589.0	109.3	100.0	125.3
Provider CV	47.6	43.4	30.6	39.4
21-50 Patients				
Mean	752.9	103.3	94.7	126.2
Provider CV	38.5	38.7	29.3	35.6
51-100 Patients				
Mean	736.9	100.5	101.1	125.9
Provider CV	36.5	42.3	24.1	36.1
101-200 Patients				
Mean	744.7	91.5	99.1	119.8
Provider CV	28.0	41.6	26.8	36.3
201-500 Patients				
Mean	644.3	83.2	89.9	107.6
Provider CV	32.2	34.1	24.0	30.7
500+ Patients				
Mean	624.8	93.7	91.5	114.0
Provider CV	24.9	29.2	22.8	26.9

Source: 1988 Medicare Part B data, five states.

Exhibit 5-6a

Podiatric Services

PATIENT-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATE, ENTIRE SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
ALL	0.00	0.00	0.00	0.00
	82.54	91.03	98.66	93.18
GEOGRAPHIC CATEGORIES				
State				
Arizona	-11.98	-34.23	-13.15	-26.47
	84.87	128.29	122.82	124.79
Connecticut	15.89	23.08	16.95	20.79
	66.18	72.34	60.81	68.33
Georgia	7.30	-26.24	-39.59	-29.26
	67.06	105.19	150.45	118.45
Kansas	9.42	3.20	10.92	5.97
	69.68	71.88	70.89	71.47
Washington	-9.12	-0.96	10.92	2.59
	102.76	84.65	68.84	80.21
Urbanization				
Urban	-1.19	4.12	1.46	3.04
	84.39	89.63	93.98	90.84
Rural	4.33	-17.58	-6.25	-13.01
	75.29	94.76	116.29	101.01
Selected MSAs				
Phoenix	-14.56	-37.50	-22.38	-31.66
	89.80	132.50	136.47	132.11
Hartford	12.54	18.95	14.89	17.37
	71.85	94.46	63.23	83.38
Atlanta	5.36	-23.12	-32.92	-25.19
	67.12	103.25	129.68	110.44
Kansas City	6.82	8.15	12.79	9.61
	70.39	73.23	58.39	68.28
Seattle	1.07	3.84	0.95	2.79
	79.19	84.90	80.35	83.19
PATIENT DEMOGRAPHICS				
Age				
Under 65	-19.91	-12.71	-14.74	-13.66
	119.29	115.89	116.08	116.09
65-69	-6.51	-13.36	-9.63	-11.87
	83.31	109.92	108.14	108.28
70-74	-0.42	-3.88	-3.60	-3.65
	75.76	97.34	103.94	98.64
75-79	3.57	-1.50	2.12	-0.12
	83.29	93.38	91.71	92.43
80-84	13.48	4.63	8.00	6.08
	68.80	81.35	96.84	85.90
85+	25.81	10.01	15.74	12.50
	58.40	71.03	70.05	70.21
Sex				
Male	6.58	-0.25	-5.59	-1.72
	83.86	96.59	112.26	101.20
Female	-1.53	0.09	2.09	0.68
	82.16	89.05	92.99	90.06

PATIENT LEVEL, GLOBAL PAYMENT RATES, ENTIRE SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
PATIENT DEMOGRAPHICS CONT'D				
Race				
White	-0.76	1.89	1.45	1.64
	83.41	88.86	94.32	90.43
Non-White	8.30	-16.14	-19.40	-16.24
	71.99	106.41	143.40	117.12
Medicaid Eligiblity				
Not Eligible	-0.97	3.56	0.06	2.24
	82.78	92.13	99.71	94.23
Eligible	10.11	-9.59	-0.53	-5.85
	79.42	87.28	88.28	87.29
Percentile Gain/Loss				
Lowest value	(815.70)	(2,664.80)	(4,174.50)	(3,084.20)
1st Percentile	(313.09)	(359.60)	(409.72)	(374.11)
5th Percentile	(159.25)	(159.19)	(150.97)	(156.51)
10th Percentile	(96.48)	(90.87)	(77.00)	(86.57)
25th Percentile	(25.10)	(14.48)	(10.18)	(13.50)
50th Percentile	24.84	24.80	27.45	25.67
75th Percentile	54.65	54.67	48.21	52.56
90th Percentile	62.68	68.52	57.59	64.72
95th Percentile	73.05	77.33	61.56	72.02
99th Percentile	85.09	77.74	67.86	74.81
Highest Value	95.15	86.88	92.27	88.97

Source: 1988 Medicare Part B data, five states.

Exhibit 5-6b

Podiatric Services

PROVIDER-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATE, ENTIRE SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	All Patients
ALL	0.00	0.00	0.00	0.00
	39.51	50.58	39.94	41.42
GEOGRAPHIC CATEGORIES				
State				
Arizona	-11.99	-34.92	-13.24	-16.78
	28.95	70.42	38.39	32.90
Connecticut	15.85	23.10	16.96	20.68
	33.58	42.90	23.33	34.67
Georgia	7.35	-26.26	-39.62	-22.68
	37.27	51.23	61.33	40.68
Kansas	10.18	3.23	11.13	7.66
	31.15	31.45	26.25	25.47
Washington	-9.47	-0.79	11.10	0.50
	52.43	38.47	23.72	47.96
Urbanization				
Urban	-2.72	4.86	1.16	2.07
	41.16	51.33	38.99	43.24
Rural	11.43	-21.72	-5.77	-9.39
	29.00	40.50	43.94	30.37
Selected MSAs				
Phoenix	-15.86	-39.76	-23.29	-23.33
	29.17	74.61	41.54	34.38
Hartford	11.97	18.61	15.37	16.65
	37.18	65.41	25.93	49.38
Atlanta	-1.06	-23.71	-34.99	-22.63
	43.91	56.75	53.15	45.76
Kansas City	6.26	8.83	13.15	8.70
	30.33	33.04	23.15	25.37
Seattle	-0.46	4.58	-0.46	2.16
	35.74	34.47	26.11	25.50
Number of Patients				
1-5 Patients	4.02	-22.06	2.21	-2.20
	51.02	101.46	52.35	63.73
6-10 Patients	2.33	-10.80	-3.30	-2.83
	55.68	60.71	53.04	45.79
11-20 Patients	21.48	-35.98	-7.10	-4.33
	37.46	87.05	48.45	41.14
21-50 Patients	-7.26	-17.75	-3.55	-8.86
	42.19	54.75	52.38	37.28
51-100 Patients	0.07	-9.60	-6.14	-5.22
	42.62	54.87	41.18	35.31
101-200 Patients	-11.98	-11.07	-4.92	-9.48
	42.77	76.69	39.15	55.49
201-500 Patients	10.84	8.79	5.00	8.16
	30.88	36.96	39.85	31.63
500+ Patients	14.24	0.74	8.74	4.02
	23.97	30.24	25.20	21.84

PROVIDER LEVEL, GLOBAL PAYMENT RATES, ENTIRE SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	All Patients
Percentile Gain/Loss				
Lowest value	-309.86	-562.12	-277.46	-436.63
1st Percentile	-160.12	-276.22	-186.01	-154.27
5th Percentile	-72.14	-164.65	-89.63	-86.77
10th Percentile	-47.19	-115.15	-59.42	-52.28
25th Percentile	-16.92	-55.14	-17.91	-19.98
50th Percentile	14.68	-4.48	8.32	7.95
75th Percentile	40.69	28.46	25.89	27.44
90th Percentile	58.13	43.26	38.31	40.57
95th Percentile	64.35	51.08	44.80	46.09
99th Percentile	83.09	68.52	56.82	57.56
Highest Value	95.15	84.66	85.68	77.74

Source: 1988 Medicare Part B data, five states.

Exhibit 5-7a

Podiatric Services

PATIENT-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATE, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
ALL	0.00	0.00	0.00	0.00
	68.61	68.20	64.30	66.94
GEOGRAPHIC CATEGORIES				
State				
Arizona	-11.66	-24.68	-7.16	-18.45
	72.64	87.40	71.61	81.67
Connecticut	12.74	20.69	10.37	17.01
	60.24	51.16	54.44	52.59
Georgia	3.48	-22.66	-23.45	-21.88
	63.80	77.89	76.43	76.86
Kansas	5.40	-1.14	5.49	1.28
	68.58	62.27	58.56	61.31
Washington	-2.09	-3.23	5.13	-0.46
	70.64	67.73	58.48	64.83
Urbanization				
Urban	-0.83	4.17	0.88	2.90
	69.34	66.07	63.55	65.38
Rural	3.01	-17.90	-3.77	-12.46
	65.82	74.00	67.32	71.50
Selected MSAs				
Phoenix	-12.83	-25.43	-12.34	-20.66
	75.18	88.87	76.11	84.17
Hartford	9.40	20.72	8.34	16.24
	65.41	53.11	54.66	54.10
Atlanta	0.27	-20.57	-20.85	-19.84
	65.04	78.34	77.34	77.49
Kansas City	4.13	4.55	5.86	4.96
	65.74	62.32	53.21	59.48
Seattle	0.29	2.08	-3.36	0.23
	67.36	65.21	66.04	65.57
PATIENT DEMOGRAPHICS				
Age				
Under 65	-10.17	-7.91	-9.10	-8.38
	77.69	75.36	71.20	74.10
65-69	-6.02	-8.01	-7.15	-7.65
	71.73	75.15	69.28	73.10
70-74	-2.60	-2.76	-2.68	-2.73
	66.70	70.90	66.54	69.31
75-79	4.46	-0.74	1.07	0.05
	65.95	68.72	62.64	66.63
80-84	11.03	2.37	5.32	3.68
	63.60	65.87	60.15	63.91
85+	21.52	6.43	11.88	8.80
	58.62	61.27	52.97	58.46
Sex				
Male	7.68	0.70	-2.55	-0.08
	63.25	68.47	66.87	67.74
Female	-1.79	-0.24	0.95	0.09
	69.68	68.11	63.30	66.60

PATIENT LEVEL, GLOBAL PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
PATIENT DEMOGRAPHICS CONT'D				
Race				
White	-0.60	1.38	0.82	1.12
	68.91	67.30	63.80	66.22
Non-White	6.50	-11.99	-11.24	-11.01
	64.98	74.53	69.84	72.62
Medicaid Eligiblity				
Not Eligible	-0.79	4.16	0.30	2.70
	68.83	67.10	64.17	66.22
Eligible	8.11	-11.20	-2.77	-7.69
	65.78	69.85	65.43	68.25
Percentile Gain/Loss				
Lowest value	-277.33	-285.83	-324.73	-298.18
1st Percentile	-233.28	-240.03	-251.18	-243.40
5th Percentile	-144.44	-147.57	-138.45	-144.47
10th Percentile	-96.63	-91.05	-81.15	-88.04
25th Percentile	-30.22	-23.46	-17.39	-21.75
50th Percentile	20.71	18.98	20.08	19.41
75th Percentile	51.39	50.38	42.46	47.84
90th Percentile	60.15	65.54	52.87	61.19
95th Percentile	71.59	75.19	57.28	69.21
99th Percentile	84.04	75.63	64.28	72.26
Highest Value	94.77	85.64	91.41	87.88

Source: 1988 Medicare Part B data, five states.

Exhibit 5-7b

Podiatric Services

PROVIDER-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATE, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	All Patients
ALL	0.00	0.00	0.00	0.00
	32.77	36.56	25.99	28.67
GEOGRAPHIC CATEGORIES				
State				
Arizona	-11.84	-25.45	-7.31	-12.55
	26.86	52.29	23.76	23.74
Connecticut	12.69	20.71	10.37	17.22
	32.47	21.62	23.27	22.06
Georgia	3.53	-22.68	-23.48	-17.97
	35.31	37.55	26.36	27.76
Kansas	6.26	-1.15	5.67	3.10
	31.33	28.25	24.26	24.02
Washington	-2.19	-3.03	5.28	-0.29
	33.65	32.63	21.16	28.71
Urbanization				
Urban	-1.77	5.14	0.94	2.36
	33.65	34.59	26.00	28.90
Rural	7.34	-23.08	-4.72	-10.70
	27.66	36.27	25.41	24.94
Selected MSAs				
Phoenix	-14.38	-27.10	-12.90	-16.28
	26.54	53.86	24.52	23.85
Hartford	8.38	20.63	8.50	15.46
	36.46	26.51	26.56	28.34
Atlanta	-3.42	-19.81	-22.30	-17.69
	42.05	39.52	27.34	31.31
Kansas City	3.31	5.30	6.57	4.80
	30.07	28.30	23.00	23.31
Seattle	-1.29	2.76	-4.11	0.05
	37.98	25.39	22.65	21.94
Number of Patients				
1-5 Patients	-4.20	-11.07	4.84	-3.06
	54.01	69.27	43.35	59.22
6-10 Patients	-4.24	-14.85	0.57	-5.22
	61.71	59.32	34.13	45.09
11-20 Patients	15.99	-21.82	-5.07	-1.45
	40.02	52.91	32.14	29.19
21-50 Patients	-7.39	-15.10	0.46	-6.67
	41.31	44.56	29.12	27.68
51-100 Patients	-5.10	-11.96	-6.23	-7.64
	38.33	47.35	25.61	32.17
101-200 Patients	-6.21	-1.97	-4.18	-3.96
	29.76	42.44	27.94	30.62
201-500 Patients	8.11	7.29	5.56	6.99
	29.62	31.57	22.67	25.45
500+ Patients	10.88	-4.43	3.86	-0.82
	22.16	30.44	21.91	22.11

PROVIDER LEVEL, GLOBAL PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation			
	Patient Cohort			
	Foot	Nail	No Procedure	All Patients
Percentile Gain/Loss				
Lowest value	-201.48	-220.79	-175.20	-183.05
1st Percentile	-152.80	-178.22	-119.27	-111.13
5th Percentile	-76.20	-129.65	-58.53	-58.71
10th Percentile	-50.95	-100.37	-41.47	-41.12
25th Percentile	-18.84	-50.84	-18.75	-19.62
50th Percentile	11.29	-7.54	2.22	2.81
75th Percentile	36.75	23.64	18.77	22.47
90th Percentile	56.06	38.81	31.91	35.35
95th Percentile	62.14	46.86	38.90	41.94
99th Percentile	81.80	65.54	52.05	53.80
Highest Value	94.77	83.21	84.09	75.63

Source: 1988 Medicare Part B data, five states.

Exhibit 5-8a

Podiatric Services

PATIENT-LEVEL SIMULATION RESULTS- STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
ALL	0.00	0.00	0.00	0.00
	68.07	65.65	63.35	64.99
GEOGRAPHIC CATEGORIES				
State				
Arizona	0.00	0.00	0.00	0.00
	65.05	70.10	66.83	68.83
Connecticut	0.00	0.00	0.00	0.00
	69.03	64.51	60.73	63.45
Georgia	0.00	0.00	0.00	0.00
	66.10	63.51	61.91	63.09
Kansas	0.00	0.00	0.00	0.00
	72.49	61.57	61.96	62.13
Washington	0.00	0.00	0.00	0.00
	69.19	65.61	61.64	64.46
Urbanization				
Urban	-1.05	0.94	0.22	0.62
	68.84	66.06	63.14	65.22
Rural	3.76	-3.36	-0.93	-2.29
	65.14	63.54	64.18	63.81
Selected MSAs				
Phoenix	-1.05	-0.60	-4.84	-2.00
	67.33	71.27	71.03	71.04
Hartford	-3.82	0.05	-2.26	-0.86
	74.96	66.96	60.99	65.33
Atlanta	-3.33	1.70	2.11	1.63
	67.39	63.87	62.65	63.61
Kansas City	-1.34	5.63	0.39	3.64
	69.49	61.61	56.30	60.19
Seattle	2.33	5.14	-8.94	0.44
	65.98	63.17	69.61	65.38
PATIENT DEMOGRAPHICS				
Age				
Under 65	-10.05	-7.52	-7.03	-7.46
	76.95	72.31	68.02	71.09
65-69	-5.90	-8.29	-6.10	-7.48
	71.14	72.70	67.85	71.06
70-74	-2.35	-3.29	-2.41	-2.96
	66.16	68.77	65.57	67.62
75-79	4.49	-0.47	1.01	0.21
	65.23	65.98	61.76	64.57
80-84	10.54	2.92	4.65	3.78
	63.47	63.02	59.86	62.01
85+	20.65	6.17	10.09	8.02
	58.90	58.81	53.43	57.06
Sex				
Male	8.05	0.73	-2.17	0.07
	63.19	66.14	65.75	65.90
Female	-1.88	-0.25	0.81	0.03
	69.03	65.47	62.41	64.61

PATIENT LEVEL, STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	Weighted Average
PATIENT DEMOGRAPHICS CONT'D				
Race				
White	-0.34	0.17	0.22	0.17
	68.21	65.65	63.36	65.00
Non-White	3.83	-1.34	-2.80	-1.61
	66.27	65.28	62.96	64.56
Medicaid Eligiblity				
Not Eligible	-0.56	0.02	-0.06	-0.03
	68.18	67.43	63.56	66.20
Eligible	5.92	-0.04	0.57	0.40
	66.56	61.43	61.46	61.64
Percentile Gain/Loss				
Lowest value	-327.89	-386.01	-365.32	-376.96
1st Percentile	-229.11	-214.86	-240.03	-223.63
5th Percentile	-143.29	-132.30	-132.45	-132.79
10th Percentile	-92.65	-85.67	-81.12	-84.46
25th Percentile	-30.91	-27.37	-17.12	-24.17
50th Percentile	20.93	13.43	21.22	16.27
75th Percentile	50.99	43.81	41.85	43.46
90th Percentile	60.54	66.45	53.04	61.84
95th Percentile	70.68	69.28	57.12	65.37
99th Percentile	83.38	79.77	64.94	75.08
Highest Value	94.59	88.48	91.99	89.87

Source: 1988 Medicare Part B data, five states.

Exhibit 5-8b

Podiatric Services

PROVIDER-LEVEL SIMULATION RESULTS- STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	All Patients
ALL	0.00	0.00	0.00	0.00
	31.57	31.50	23.50	25.41
GEOGRAPHIC CATEGORIES				
State				
Arizona	0.00	0.00	0.00	0.00
	24.02	41.68	22.15	19.97
Connecticut	0.00	0.00	0.00	0.00
	37.18	27.27	25.97	27.61
Georgia	0.00	0.00	0.00	0.00
	36.60	30.61	21.35	24.00
Kansas	0.00	0.00	0.00	0.00
	33.42	27.93	25.72	25.12
Washington	0.00	0.00	0.00	0.00
	32.93	31.67	22.34	28.11
Urbanization				
Urban	-1.80	1.71	0.41	0.51
	32.18	32.14	23.92	26.52
Rural	7.46	-6.42	-2.00	-2.09
	27.67	28.14	21.27	20.63
Selected MSAs				
Phoenix	-2.27	-1.32	-5.21	-3.09
	23.73	42.94	22.85	19.94
Hartford	-4.94	-0.11	-2.09	-1.53
	41.76	33.43	29.64	35.57
Atlanta	-7.21	2.33	0.95	0.79
	43.59	32.21	22.14	26.79
Kansas City	-3.15	6.38	0.96	2.06
	32.08	27.97	24.38	25.51
Seattle	0.88	5.62	-9.92	0.64
	37.17	24.65	23.91	22.10
Number of Patients				
1-5 Patients	-5.09	-8.96	7.69	-2.19
	53.21	69.20	44.33	58.97
6-10 Patients	-7.44	-21.91	2.52	-7.33
	63.90	60.09	32.30	45.51
11-20 Patients	17.20	-16.84	1.04	2.36
	41.67	49.49	29.30	28.64
21-50 Patients	-6.26	-8.29	5.12	-2.60
	40.38	38.09	26.03	24.19
51-100 Patients	-3.57	-9.84	-4.99	-6.03
	37.46	40.61	23.43	29.99
101-200 Patients	-3.53	1.28	-1.06	-0.92
	28.74	36.17	24.64	26.76
201-500 Patients	4.82	4.78	1.97	4.07
	28.25	27.72	22.35	22.84
500+ Patients	7.87	-4.34	0.71	-1.77
	22.41	25.25	16.59	18.05

PROVIDER LEVEL, STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort			
	Foot	Nail	No Procedure	All Patients
Percentile Gain/Loss				
Lowest value	-213.59	-280.59	-178.90	-233.02
1st Percentile	-162.05	-162.84	-120.80	-128.16
5th Percentile	-72.19	-104.32	-53.80	-49.49
10th Percentile	-52.46	-79.32	-37.12	-31.85
25th Percentile	-19.45	-36.28	-16.43	-15.17
50th Percentile	7.03	-3.79	1.97	2.91
75th Percentile	34.81	19.38	18.43	18.95
90th Percentile	55.04	35.47	30.97	31.44
95th Percentile	61.00	47.50	39.28	40.03
99th Percentile	82.19	69.12	51.81	59.54
Highest Value	94.01	86.31	82.24	80.14

Source: 1988 Medicare Part B data, five states.

Exhibit 5-9
Cardiac Testing Package

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION

	Mean	Patient CV	Provider CV
		ENTIRE SAMPLE (INCLUDING OUTLIERS)	
ALL FIVE STATES	364.8	59.2	35.7
		TRIMMED SAMPLE (EXCLUDING OUTLIERS)	
ALL FIVE STATES	345.8	44.8	28.5
INDIVIDUAL STATES			
Arizona	382.1	38.4	21.4
Connecticut	331.0	49.9	33.9
Georgia	307.7	49.6	34.5
Kansas	354.8	43.5	25.3
Washington	351.2	41.6	24.1
URBANIZATION			
Urban	346.7	45.1	29.1
Rural	343.1	43.7	25.6
SELECTED MSAs			
Phoenix	400.0	37.4	18.6
Hartford	324.8	49.5	35.4
Atlanta	311.3	50.1	37.8
Kansas City	366.5	41.4	21.7
Seattle	346.9	39.5	22.7
AGE			
Under 65	335.8	46.2	N/A
65-69	351.9	45.3	N/A
70-74	350.3	44.9	N/A
75-79	343.8	44.2	N/A
80-84	332.5	42.2	N/A
85+	313.0	39.0	N/A
SEX			
Male	354.8	45.0	N/A
Female	336.0	44.3	N/A

Cardiac Testing Package

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Mean	Patient CV	Provider CV
RACE			
White	348.5	44.6	N/A
Non-white	309.7	46.3	N/A
MEDICAID ELIGIBILITY			
Non-Eligible	348.0	44.7	N/A
Eligible	309.4	45.0	N/A
NUMBER OF PATIENTS			
1-5 Patients	331.8	N/A	37.1
6-10 Patients	326.8	N/A	30.5
11-20 Patients	328.6	N/A	30.3
20+ Patients	354.7	N/A	25.8
SPECIALTY (Treating 100+ Patients)			
General Practice (01)	344.4	N/A	32.3
Cardiology (06)	354.6	N/A	27.1
Family Practice (08)	352.0	N/A	28.1
Internal Medicine (11)	314.9	N/A	30.8
Neurology (13)	446.8	N/A	9.0
Group Practice (70)	301.2	N/A	30.6

Source: 1988 Medicare Part B data, five states.

Exhibit 5-10a

Cardiac Testing Package

PATIENT-LEVEL SIMULATION RESULTS

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Type of Payment Approach		
	Global Rate, Entire Sample	Global Rate, Trimmed Sample	State-specific Rates, Trimmed Sample
ALL	0.00	0.00	0.00
	59.21	44.78	44.20
GEOGRAPHIC CATEGORIES			
State			
Arizona	-13.33	-10.49	0.00
	74.45	42.46	38.43
Connecticut	5.32	4.28	0.00
	54.07	47.76	49.90
Georgia	11.66	11.01	0.00
	53.81	44.15	49.62
Kansas	-2.18	-2.61	0.00
	55.39	44.64	43.50
Washington	-0.63	-1.57	0.00
	51.63	42.22	41.57
Urbanization			
Urban	-0.88	-0.28	-0.16
	61.79	45.27	44.51
Rural	2.47	0.78	0.46
	51.13	43.33	43.24
Selected MSAs			
Phoenix	-16.77	-15.68	-4.69
	63.22	43.27	39.16
Hartford	7.75	6.07	1.87
	52.05	46.54	48.62
Atlanta	10.41	9.96	-1.17
	57.45	45.10	50.68
Kansas City	-8.21	-6.00	-3.31
	62.65	43.93	42.81
Seattle	2.71	-0.31	1.25
	44.55	39.63	39.01
PATIENT DEMOGRAPHICS			
Age			
Under 65	1.05	2.89	1.46
	71.98	44.91	44.73
65-69	-2.90	-1.77	-1.87
	61.31	46.08	45.71
70-74	-1.70	-1.30	-1.02
	58.45	45.49	44.70
75-79	2.97	0.58	0.93
	51.92	43.98	43.21
80-84	5.62	3.85	4.22
	57.88	40.62	40.00
85+	12.86	9.49	9.19
	39.09	35.33	34.38
Sex			
Male	-4.20	-2.62	-2.25
	65.78	46.15	45.47
Female	4.59	2.82	2.45
	50.70	43.09	42.62

PATIENT LEVEL SIMULATION RESULTS, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Type of Payment Approach		
	Global Rate, Entire Sample	Global Rate, Trimmed Sample	State-specific Rates, Trimmed Sample
PATIENT DEMOGRAPHICS CONT'D			
Race			
White	-0.96	-0.77	-0.38
	60.05	44.92	44.21
Non-White	13.10	10.44	5.43
	44.30	41.51	43.62
Medicaid Eligiblity			
Not Eligible	-0.77	-0.64	-0.34
	59.84	44.96	44.27
Eligible	12.91	10.53	5.88
	45.52	40.22	42.27
Percentile Gain/Loss			
Lowest value	-1446.60	-174.72	-207.22
1st Percentile	-204.23	-146.21	-147.36
5th Percentile	-101.61	-94.95	-91.96
10th Percentile	-63.77	-62.16	-60.26
25th Percentile	-17.04	-21.17	-18.67
50th Percentile	9.87	6.55	9.40
75th Percentile	33.56	30.63	27.62
90th Percentile	54.84	52.35	49.88
95th Percentile	57.72	55.67	56.53
99th Percentile	65.80	63.91	63.37
Highest Value	77.82	76.60	77.20

Source: 1988 Medicare Part B data, five states.

Exhibit 5-10b

Cardiac Testing Package

PROVIDER-LEVEL SIMULATION RESULTS

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Type of Payment Approach		
	Global Rate, Entire Sample	Global Rate, Trimmed Sample	State-specific Rates, Trimmed Sample
ALL	0.00	0.00	0.00
	35.66	28.48	27.54
GEOGRAPHIC CATEGORIES			
State			
Arizona	-13.08	-10.46	0.00
	39.52	23.60	21.36
Connecticut	5.35	4.30	0.00
	35.77	32.43	33.89
Georgia	11.71	11.06	0.00
	36.59	30.66	34.47
Kansas	-2.22	-2.64	0.00
	31.68	25.94	25.27
Washington	-0.68	-1.57	0.00
	28.52	24.48	24.11
Urbanization			
Urban	-1.25	-0.62	-0.44
	37.13	29.32	28.03
Rural	4.76	2.32	1.67
	28.85	24.96	25.53
Selected MSAs			
Phoenix	-16.98	-16.22	-5.22
	26.68	21.59	19.55
Hartford	6.59	5.31	1.05
	36.05	33.53	35.04
Atlanta	10.47	10.43	-0.71
	42.36	33.88	38.10
Kansas City	-11.56	-9.22	-6.41
	34.47	23.70	23.09
Seattle	2.62	-0.44	1.12
	22.91	22.79	22.44
Number of Patients			
1-5 Patients	3.34	4.04	2.75
	50.72	35.63	36.31
6-10 Patients	5.52	5.50	4.42
	44.62	28.79	29.61
11-20 Patients	5.99	4.97	4.09
	34.46	28.75	28.98
20+ Patients	-2.58	-2.57	-1.96
	30.57	26.50	24.82
Specialty (Treating 100+ Patients)			
General Practice (01)	3.17	0.39	2.30
	34.58	32.15	31.13
Cardiology (06)	-2.29	-2.54	-2.29
	34.78	27.82	27.12
Family Practice (08)	-3.46	-1.80	0.62
	38.17	28.62	28.03
Internal Medicine (11)	10.88	8.93	6.67
	32.64	28.07	28.17
Neurology (13)	-52.87	-29.22	-17.57
	15.46	11.58	9.48
Group Practice (70)	15.44	12.89	14.28
	29.82	26.68	26.37

PROVIDER LEVEL SIMULATION RESULTS, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Type of Payment Approach		
	Global Rate, Entire Sample	Global Rate, Trimmed Sample	State-specific Rates, Trimmed Sample
Percentile Gain/Loss			
Lowest value	-638.16	-169.72	-203.28
1st Percentile	-173.33	-107.80	-127.47
5th Percentile	-71.01	-62.42	-65.06
10th Percentile	-39.94	-39.21	-40.29
25th Percentile	-11.58	-14.33	-15.03
50th Percentile	11.29	7.94	7.61
75th Percentile	30.64	27.64	26.34
90th Percentile	46.71	44.27	42.95
95th Percentile	55.03	52.59	52.60
99th Percentile	65.32	63.41	61.84
Highest Value	70.72	69.10	69.90

Source: 1988 Medicare Part B data, five states.

Exhibit 5-11

Cancer Treatment Packages

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION

	Patient Cohort					
	Digestive	Respiratory	Breast	Blood/ Lymph	Other	Weighted Average
		ENTIRE SAMPLE (INCLUDING OUTLIERS)				
ALL FIVE STATES						
Mean	294.7	382.1	240.0	234.8	253.1	268.4
Patient CV	98.8	76.5	63.7	73.2	76.0	78.2
Provider CV	84.2	61.4	50.8	49.1	53.1	58.4
		TRIMMED SAMPLE (EXCLUDING OUTLIERS)				
ALL FIVE STATES						
Mean	270.3	358.0	228.1	221.5	236.6	250.9
Patient CV	63.3	66.2	55.4	64.3	62.8	62.8
Provider CV	47.3	52.8	44.1	41.2	43.2	44.6
INDIVIDUAL STATES						
Arizona						
Mean	258.3	371.8	222.9	231.4	219.3	245.3
Patient CV	66.5	66.7	57.2	65.4	63.0	64.0
Provider CV	45.0	56.3	40.1	32.8	39.3	40.7
Connecticut						
Mean	264.4	310.7	198.6	198.5	233.3	235.2
Patient CV	50.8	64.4	49.2	56.6	64.0	58.4
Provider CV	38.3	51.8	32.9	31.3	39.5	38.0
Georgia						
Mean	209.0	308.6	199.4	211.5	207.0	218.1
Patient CV	55.4	56.5	53.1	65.6	56.0	57.8
Provider CV	42.4	44.0	40.4	45.5	34.8	40.2
Kansas						
Mean	256.5	449.2	242.1	247.2	275.6	280.1
Patient CV	68.3	63.5	52.8	62.9	65.1	63.7
Provider CV	50.0	48.9	40.7	38.3	48.6	45.7
Washington						
Mean	340.8	330.0	280.7	208.7	235.0	262.9
Patient CV	59.7	66.8	54.3	65.3	59.0	60.8
Provider CV	43.4	48.8	46.0	48.4	39.0	43.7
URBANIZATION						
Urban						
Mean	276.1	346.5	231.9	216.8	233.8	249.0
Patient CV	59.3	64.1	54.5	64.3	60.8	61.0
Provider CV	44.2	48.0	42.8	40.8	38.2	41.4
Rural						
Mean	253.4	382.7	218.8	233.7	243.3	254.7
Patient CV	74.9	69.4	57.9	64.0	67.2	67.1
Provider CV	56.1	59.3	47.8	42.5	54.4	51.8
SELECTED MSAs						
Phoenix						
Mean	260.3	366.8	229.7	222.9	223.2	245.4
Patient CV	60.8	64.9	46.5	61.8	59.8	59.5
Provider CV	33.1	47.3	33.0	25.5	34.4	33.3
Hartford						
Mean	216.8	260.6	183.1	180.0	216.6	209.3
Patient CV	42.7	58.1	54.4	54.8	60.5	55.1
Provider CV	29.7	47.5	40.7	38.6	39.6	38.5

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Patient Cohort					
	Digestive	Respiratory	Breast	Blood/ Lymph	Other	Weighted Average
Atlanta						
Mean	234.7	363.1	222.9	219.9	217.0	236.7
Patient CV	42.6	50.7	43.9	67.4	54.3	53.7
Provider CV	34.2	40.7	39.0	48.7	34.0	38.6
Kansas City						
Mean	216.3	311.5	201.1	192.5	188.6	208.6
Patient CV	61.1	44.6	54.3	65.9	58.9	58.9
Provider CV	47.1	31.3	44.2	38.9	36.1	39.1
Seattle						
Mean	308.2	313.6	312.0	217.9	237.6	261.8
Patient CV	53.0	59.5	54.8	69.0	56.9	59.0
Provider CV	38.5	45.5	41.6	49.4	39.0	42.2
AGE						
Under 65						
Mean	275.7	312.3	234.7	208.7	204.0	232.5
Patient CV	72.2	78.1	56.8	70.0	58.6	65.4
65-69						
Mean	279.0	362.3	234.9	229.8	243.9	258.3
Patient CV	62.4	61.0	52.6	63.8	62.3	61.4
70-74						
Mean	276.0	399.1	229.8	235.8	244.2	262.5
Patient CV	60.3	65.1	56.1	61.4	64.5	62.2
75-79						
Mean	253.8	314.1	205.8	200.1	234.1	235.2
Patient CV	64.4	70.8	60.5	64.5	62.1	63.8
80-84						
Mean	228.5	382.1	188.6	215.8	227.9	237.0
Patient CV	77.2	63.7	74.2	66.3	61.4	67.0
85+						
Mean	323.6	438.5	167.7	205.4	196.3	243.2
Patient CV	34.9	27.4	54.0	65.8	58.0	52.0
SEX						
Male						
Mean	274.3	368.6	n/a	217.2	249.1	260.0
Patient CV	63.1	68.7	n/a	64.3	62.5	63.8
Female						
Mean	264.3	341.3	228.1	226.6	226.0	245.2
Patient CV	63.6	60.9	55.4	64.2	62.7	62.2
RACE						
White						
Mean	269.9	362.0	227.1	224.5	238.5	252.5
Patient CV	62.1	66.1	55.3	63.9	62.9	62.5
Non-white						
Mean	275.7	300.6	242.3	178.4	196.3	222.3
Patient CV	81.7	65.2	57.8	66.0	57.3	64.5

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Patient Cohort					
	Digestive	Respiratory	Breast	Blood/ Lymph	Other	Weighted Average
MEDICAID ELIGIBILITY						
Not Eligible						
Mean	271.7	362.3	226.4	223.4	238.3	252.5
Patient CV	63.2	66.3	54.4	64.3	62.8	62.7
Eligible						
Mean	213.3	283.0	249.9	169.3	200.0	209.5
Patient CV	62.7	53.4	66.0	50.0	60.8	58.5
DURATION OF TREAMENT						
1 Month						
Mean	263.4	354.6	245.3	219.7	245.0	254.0
Patient CV	60.4	68.6	40.6	58.3	76.9	64.9
2 Months						
Mean	281.0	415.8	242.1	248.4	245.0	269.6
Patient CV	69.9	59.4	62.8	64.5	66.5	65.5
3 Months						
Mean	273.9	340.4	219.5	258.5	260.2	266.1
Patient CV	65.1	79.7	72.6	64.6	60.2	65.5
4-6 Months						
Mean	290.1	368.8	217.8	234.0	241.2	259.0
Patient CV	63.6	68.7	59.6	66.6	64.2	64.6
7-12 Months						
Mean	254.2	340.1	233.3	208.4	227.6	240.3
Patient CV	60.4	59.3	49.2	62.5	59.7	59.3
NUMBER OF PATIENTS						
1-5 Patients						
Mean	212.2	262.3	190.4	174.8	206.3	204.3
Provider CV	64.0	70.7	60.7	60.1	58.5	61.3
6-10 Patients						
Mean	271.5	340.6	219.8	242.6	229.1	250.2
Provider CV	45.8	49.0	45.2	43.6	44.0	44.9
11-20 Patients						
Mean	294.6	332.7	219.9	219.6	225.8	247.2
Provider CV	52.5	53.0	47.8	38.5	39.9	44.1
20+ Patients						
Mean	285.7	414.6	254.3	237.5	266.0	277.2
Provider CV	33.0	45.1	32.0	30.7	32.4	33.4

AVERAGE ADJUSTED CHARGES AND COEFFICIENTS OF VARIATION, cont'd.

	Patient Cohort					
	Digestive	Respiratory	Breast	Blood/ Lymph	Other	Weighted Average
SPECIALTY (100+ patients)						
General Surgery						
Mean	260.7	338.6	180.0	218.8	288.5	261.1
Provider CV	66.2	52.6	53.3	54.6	56.7	57.1
Internal Medicine						
Mean	296.9	395.8	249.8	232.0	250.9	269.8
Provider CV	42.8	51.0	43.0	39.6	41.3	42.4
Urology						
Mean	70.3	N/A	N/A	257.7	209.3	181.7
Provider CV	65.9	N/A	N/A	9.6	42.4	33.7
Infectious Diseases						
Mean	267.3	302.8	201.8	198.1	238.5	237.2
Provider CV	38.8	53.6	33.3	34.2	34.7	37.1
Unknown						
Mean	213.2	332.2	213.7	214.8	211.5	225.3
Provider CV	43.9	27.9	36.8	39.6	27.3	34.2

Source: 1988 Medicare Part B data, five states.

Exhibit 5-12a

Cancer Treatment Package

PATIENT-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATES, ENTIRE SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	Weighted Average
ALL	0.00	0.00	0.00	0.00	0.00	0.00
	98.77	76.51	63.73	73.25	75.96	78.15
GEOGRAPHIC CATEGORIES						
State						
Arizona	3.59	2.69	7.14	-4.90	9.89	4.37
	77.57	64.91	53.09	75.89	62.37	67.40
Connecticut	5.87	13.48	3.08	15.45	2.81	7.36
	60.31	69.38	77.11	47.82	69.40	63.73
Georgia	11.99	19.22	14.40	7.19	16.27	13.55
	173.32	45.60	52.37	66.13	51.24	76.02
Kansas	7.12	-34.40	-4.77	-18.69	-18.85	-14.24
	73.67	101.26	59.57	90.53	94.31	86.68
Washington	-23.00	11.03	-20.97	9.44	-1.64	-3.76
	86.06	63.44	68.89	62.68	79.16	73.91
Urbanization						
Urban	-2.35	5.04	-2.21	3.20	2.52	1.55
	103.54	69.27	65.40	69.82	68.26	74.73
Rural	6.78	-10.68	5.45	-8.15	-6.00	-3.43
	83.37	89.44	59.24	80.91	91.55	83.92
Selected MSAs						
Phoenix	1.28	4.02	4.27	5.09	7.73	5.21
	77.11	62.32	44.51	58.70	62.49	62.27
Hartford	26.44	31.80	23.69	23.34	12.02	20.50
	31.39	39.62	41.51	42.03	57.42	45 69
Atlanta	12.73	4.97	7.12	6.35	11.92	9.56
	57.68	48.14	40.78	63.14	52.43	54.07
Kansas City	26.61	18.48	9.20	18.01	25.46	21.48
	44.88	36.33	59.34	54.03	43.88	47.26
Seattle	-9.23	17.92	-30.01	7.23	3.42	-0.14
	67.26	48.82	71.21	64.00	60.10	62.31
PATIENT DEMOGRAPHICS						
Age						
Under 65	-4.87	18.27	-4.44	8.68	8.09	5.59
	88.29	63.83	71.31	66.86	73.70	73.48
65-69	-10.20	-2.04	-3.31	-5.93	-0.69	-4.01
	138.66	75.17	64.77	80.10	70.59	84.77
70-74	5.16	-8.97	1.31	-4.89	-6.08	-3.29
	59.25	76.16	58.64	70.39	89.00	74.81
75-79	4.58	5.43	6.07	7.29	4.03	5.24
	79.66	88.18	67.80	73.12	66.73	72.84
80-84	22.47	0.00	21.40	3.98	2.79	8.33
	59.87	63.71	58.31	71.55	70.21	66.68
85+	-9.81	-14.76	30.13	12.51	22.43	11.39
	38.32	31.39	37.71	57.55	44.97	44.42
Sex						
Male	-4.29	-4.67		1.07	-5.04	-3.29
	115.26	83.99		73.43	76.79	84.52
Female	6.43	7.40	0.00	-1.31	4.31	3.27
	66.47	62.39	63.73	73.08	75.02	70.50

PATIENT LEVEL, GLOBAL PAYMENT RATES, ENTIRE SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	Weighted Average
PATIENT DEMOGRAPHICS CONT'D						
Race						
White	-0.36	-1.45	0.07	-1.35	-0.69	-0.78
	99.92	77.76	64.15	73.75	76.36	78.80
Non-White	6.45	21.32	-0.95	19.21	14.44	13.12
	76.41	51.27	58.34	63.04	65.70	64.72
Medicaid Eligiblity						
Not Eligible	-0.36	-0.95	0.30	-1.02	-0.08	-0.39
	99.30	77.24	63.42	74.07	74.02	77.74
Eligible	13.62	16.34	-4.11	27.89	1.75	10.66
	76.62	61.65	68.72	36.07	110.01	77.77
Duration of Treatment						
1 Month	-48.61	-2.50	-10.47	-15.57	-41.38	-29.42
	267.50	88.88	57.33	99.21	153.50	144.42
2 Months	-3.75	-43.16	-13.64	-19.93	-2.20	-11.99
	83.13	113.34	81.82	94.94	80.11	87.64
3 Months	7.06	3.45	0.98	-25.20	-14.67	-9.56
	60.53	90.84	81.90	94.92	84.46	82.92
4-6 Months	-3.10	1.95	5.79	-4.14	0.48	-0.47
	71.45	68.53	62.47	74.60	69.71	70.21
7-12 Months	9.78	11.00	-1.07	9.14	7.42	7.68
	63.11	52.82	57.76	60.91	60.80	60.08
Percentile Gain/Loss						
Lowest value	-1860.40	-430.10	-336.20	-475.40	-716.30	-795.50
1st Percentile	-303.12	-316.97	-263.77	-289.29	-286.73	-290.88
5th Percentile	-137.66	-151.61	-114.84	-149.42	-136.56	-138.86
10th Percentile	-82.87	-94.50	-73.50	-93.22	-85.22	-86.29
25th Percentile	-19.53	-28.35	-29.56	-26.57	-26.16	-25.67
50th Percentile	19.02	20.41	14.54	19.38	18.84	18.69
75th Percentile	50.04	53.92	44.15	49.12	50.13	49.63
90th Percentile	67.16	71.76	62.01	71.39	67.99	68.35
95th Percentile	76.10	77.99	73.17	76.85	75.88	76.06
99th Percentile	84.70	88.90	85.23	85.09	84.53	85.22
Highest Value	91.87	93.63	88.60	89.64	90.67	90.73

Source: 1988 Medicare Part B data, five states.

Exhibit 5-12b

Cancer Treatment Package

PROVIDER-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATES, ENTIRE SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	All Patients
ALL	0.00	0.00	0.00	0.00	0.00	0.00
	84.19	61.39	50.76	49.07	53.13	54.81
GEOGRAPHIC CATEGORIES						
State						
Arizona	4.13	3.50	7.48	-5.29	8.67	3.78
	46.60	54.36	37.06	45.77	43.55	37.16
Connecticut	5.57	13.48	3.38	15.45	3.48	7.35
	38.87	61.86	53.72	26.49	47.58	38.60
Georgia	11.99	19.22	14.40	7.19	16.27	13.72
	169.45	35.57	43.87	45.76	29.87	76.09
Kansas	6.75	-35.09	-4.77	-18.69	-19.11	-15.68
	51.48	75.94	49.16	58.17	70.21	60.38
Washington	-23.27	11.03	-21.77	9.98	-1.17	-3.34
	64.36	46.12	56.94	46.12	51.17	42.16
Urbanization						
Urban	-4.43	6.69	-3.81	1.92	2.24	0.85
	90.87	52.17	52.61	45.51	45.09	52.25
Rural	14.98	-16.90	12.35	-6.29	-6.52	-2.59
	53.26	77.56	41.92	58.82	71.16	61.80
Selected MSAs						
Phoenix	-0.19	-5.14	1.45	-1.63	3.71	0.44
	40.03	49.71	32.48	25.88	44.47	31.06
Hartford	26.20	37.68	23.78	24.40	13.08	22.71
	21.91	29.60	31.01	29.16	41.81	29.24
Atlanta	14.66	8.03	6.32	3.40	12.14	8.75
	36.74	37.40	36.50	47.05	30.86	29.65
Kansas City	30.62	21.70	8.35	18.67	26.72	22.70
	32.66	24.52	52.74	31.60	26.48	29.52
Seattle	-7.07	19.26	-33.43	8.13	1.30	-0.25
	48.57	36.74	55.45	45.38	47.61	37.02
Number of Patients						
1-5 Patients	16.47	27.62	15.53	17.48	11.15	15.35
	154.03	57.07	58.12	60.85	66.03	88.98
6-10 Patients	-4.22	7.33	11.03	-1.60	8.41	3.88
	66.64	50.02	41.68	45.03	43.78	37.00
11-20 Patients	-5.71	9.37	-0.31	1.17	1.12	1.02
	57.25	57.77	56.97	45.58	51.85	41.96
20+ Patients	-3.60	-18.18	-10.19	-8.82	-11.14	-10.18
	40.21	63.08	40.87	44.09	43.80	39.28
Specialty (Treating 100+ Patients)						
General Surgery	-25.90	11.38	4.50	-16.90	-29.23	-20.62
	268.41	46.60	75.19	81.04	80.50	170.21
Internal Medicine	-8.77	-11.72	-6.35	-5.66	-6.22	-7.43
	54.46	64.14	47.88	50.54	51.48	44.45
Urology	76.13	N/A	N/A	-9.77	11.75	12.72
	15.74	N/A	N/A	10.51	45.80	45.41
Infectious Diseases	6.13	14.48	-0.17	15.66	0.56	6.14
	39.13	65.46	55.91	28.84	44.35	38.88
Unknown	24.02	13.06	7.28	5.69	15.06	13.04
	36.35	24.29	47.21	40.85	24.33	19.61

PROVIDER LEVEL, GLOBAL PAYMENT RATES, ENTIRE SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	All Patients
Percentile Gain/Loss						
Lowest value	-1860.40	-386.30	-309.30	-239.60	-602.40	-1860.40
1st Percentile	-194.03	-214.75	-200.90	-198.99	-249.96	-209.83
5th Percentile	-86.87	-88.68	-106.81	-94.27	-110.85	-86.09
50th Percentile	-58.77	-52.29	-67.44	-49.58	-57.87	-46.83
25th Percentile	-8.26	-11.22	-29.24	-15.89	-12.81	-7.79
50th Percentile	28.62	22.75	10.91	17.26	20.49	25.64
75th Percentile	52.96	52.18	43.14	46.58	49.21	51.49
90th Percentile	68.04	71.97	60.53	67.72	64.33	67.41
95th Percentile	76.09	77.18	72.09	76.71	74.95	76.67
99th Percentile	83.86	88.17	85.92	84.85	86.04	85.47
Highest Value	91.87	89.71	88.12	87.86	90.67	90.67

Source: 1988 Medicare Part B data, five states.

Exhibit 5-13a

Cancer Treatment Package

PATIENT-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATE, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	Weighted Average
ALL FIVE STATES	0.00	0.00	0.00	0.00	0.00	0.00
	63.26	66.16	55.41	64.28	62.84	62.77
GEOGRAPHIC CATEGORIES						
State						
Arizona	4.43	-3.87	2.29	-4.50	7.31	2.41
	63.60	69.28	55.86	68.36	58.41	62.44
Connecticut	2.16	13.20	12.92	10.36	1.41	6.05
	49.67	55.94	42.85	50.70	63.10	54.93
Georgia	22.67	13.78	12.55	4.52	12.50	12.65
	42.86	48.67	46.40	62.59	48.96	50.64
Kansas	5.10	-25.47	-6.16	-11.59	-16.48	-11.31
	64.78	79.63	56.04	70.24	75.87	70.83
Washington	-26.10	7.81	-23.08	5.76	0.67	-4.83
	75.22	61.55	66.84	61.51	58.61	63.45
Urbanization						
Urban	-2.16	3.20	-1.68	2.13	1.18	0.69
	60.59	62.05	55.41	62.90	60.04	60.49
Rural	6.24	-6.90	4.08	-5.51	-2.83	-1.48
	70.21	74.22	55.56	67.53	69.10	67.99
Selected MSAs						
Phoenix	3.68	-2.45	-0.73	-0.63	5.67	2.34
	58.57	66.52	46.83	62.23	56.43	58.12
Hartford	19.79	27.21	19.70	18.72	8.45	15.99
	34.23	42.29	43.67	44.56	55.42	46.52
Atlanta	13.14	-1.43	2.27	0.70	8.28	5.77
	37.00	51.38	42.91	66.94	49.83	50.81
Kansas City	19.97	12.99	11.83	13.07	20.27	16.91
	48.93	38.78	47.84	57.28	46.93	48.89
Seattle	-14.05	12.39	-36.80	1.63	-0.40	-5.04
	60.40	52.11	74.93	67.86	57.10	61.56
PATIENT DEMOGRAPHICS						
Age						
Under 65	-2.00	12.77	-2.92	5.79	13.78	7.21
	73.65	68.13	58.46	65.95	50.52	60.85
65-69	-3.23	-1.22	-3.01	-3.75	-3.08	-3.06
	64.41	61.72	54.15	66.23	64.18	63.33
70-74	-2.13	-11.50	-0.77	-6.46	-3.21	-4.34
	61.63	72.57	56.52	65.31	66.53	64.91
75-79	6.10	12.25	9.75	9.63	1.06	6.02
	60.44	62.16	54.56	58.32	61.42	59.87
80-84	15.46	-6.73	17.29	2.55	3.70	5.95
	65.28	68.00	61.35	64.59	59.15	62.64
85+	-19.73	-22.49	26.48	7.24	17.03	5.16
	41.78	33.51	39.68	61.02	48.09	47.45
Sex						
Male	-1.50	-2.97		1.92	-5.27	-2.42
	64.00	70.78		63.06	65.80	65.33
Female	2.22	4.65	0.00	-2.33	4.49	2.06
	62.18	58.10	55.41	65.72	59.88	60.94

PATIENT LEVEL, GLOBAL PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	Weighted Average
PATIENT DEMOGRAPHICS CONT'D						
Race						
White	0.12	-1.11	0.44	-1.37	-0.81	-0.66
	61.98	66.79	55.02	64.79	63.37	62.89
Non-White	-2.00	16.03	-6.22	19.44	17.03	11.52
	83.32	54.72	61.39	53.17	47.56	57.49
Medicaid Eligiblity						
Not Eligible	-0.53	-1.19	0.72	-0.88	-0.71	-0.61
	63.51	67.10	53.96	64.90	63.24	63.05
Eligible	21.08	20.95	-9.55	23.54	15.48	16.14
	49.51	42.19	72.31	38.25	51.41	49.42
Duration of Treatment						
1 Month	2.54	0.95	-7.55	0.79	-3.55	-1.45
	58.83	67.90	43.71	57.82	79.64	65.82
2 Months	-3.98	-16.15	-6.15	-12.14	-3.53	-7.16
	72.73	69.05	66.68	72.32	68.84	70.11
3 Months	-1.34	4.93	3.77	-16.72	-9.95	-6.89
	66.00	75.80	69.87	75.35	66.20	69.63
4-6 Months	-7.34	-3.02	4.50	-5.67	-1.94	-3.16
	68.25	70.76	56.94	70.39	65.49	66.70
7-12 Months	5.96	5.01	-2.29	5.92	3.80	4.13
	56.79	56.38	50.30	58.80	57.42	56.73
Percentile Gain/Loss						
Lowest value	-273.13	-216.00	-201.46	-213.84	-249.84	-237.06
1st Percentile	-222.98	-206.99	-183.45	-189.94	-204.07	-202.31
5th Percentile	-123.62	-145.59	-109.76	-140.14	-126.31	-129.15
10th Percentile	-82.76	-97.27	-74.28	-93.32	-85.34	-86.71
25th Percentile	-28.00	-33.77	-34.28	-31.80	-30.72	-31.18
50th Percentile	13.27	16.31	11.63	15.52	14.66	14.45
75th Percentile	45.88	51.99	41.49	46.60	47.44	46.79
90th Percentile	64.40	70.07	60.03	69.77	66.24	66.43
95th Percentile	74.11	76.76	71.77	75.53	74.30	74.52
99th Percentile	83.65	88.29	84.47	84.24	83.94	84.47
Highest Value	91.13	93.20	88.01	89.01	90.02	90.10

Source: 1988 Medicare Part B data, five states.

Exhibit 5-13b

Cancer Treatment Package

PROVIDER-LEVEL SIMULATION RESULTS- GLOBAL PAYMENT RATE, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER					
	Standard Deviation					
	Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	All Patients
ALL FIVE STATES	0.00	0.00	0.00	0.00	0.00	0.00
	47.29	52.77	44.15	41.23	43.17	37.45
GEOGRAPHIC CATEGORIES						
State						
Arizona	4.90	-3.00	2.64	-5.05	7.49	2.41
	42.80	58.02	39.00	34.47	36.37	32.82
Connecticut	1.80	13.20	13.43	10.36	2.15	6.23
	37.61	44.95	28.51	28.09	38.69	28.74
Georgia	22.67	13.78	12.55	4.52	12.50	12.50
	32.78	37.97	35.32	43.44	30.47	29.34
Kansas	4.70	-26.10	-6.16	-11.59	-16.81	-12.29
	47.60	61.72	43.25	42.73	56.73	47.88
Washington	-26.26	7.81	-23.89	6.36	0.47	-4.33
	54.81	44.98	57.04	45.28	38.80	35.73
Urbanization						
Urban	14.14	-11.47	7.78	-2.00	-2.31	-0.08
	48.14	66.12	44.11	43.35	55.65	32.44
Rural	-4.44	4.42	-2.46	0.64	0.80	0.22
	46.14	45.86	43.88	40.51	37.89	49.36
Selected MSAs						
Phoenix	1.04	-12.22	-3.70	-7.75	3.76	-1.84
	32.78	53.06	34.17	27.44	33.15	25.37
Hartford	19.53	33.49	19.80	19.84	9.59	18.21
	23.89	31.60	32.63	30.92	35.84	26.76
Atlanta	16.61	1.83	1.42	-2.42	8.54	4.54
	28.52	39.92	38.41	49.89	31.05	30.99
Kansas City	24.35	16.42	10.67	13.77	21.63	18.31
	35.61	26.17	39.52	33.51	28.32	28.06
Seattle	-11.66	13.82	-40.40	2.59	-1.25	-4.41
	42.96	39.21	58.34	48.12	39.44	33.71
Number of Patients						
1-5 Patients	21.47	26.74	16.53	21.09	12.80	17.68
	50.26	51.79	50.66	47.46	50.97	47.19
6-10 Patients	-0.46	4.85	3.65	-9.38	3.19	0.15
	46.04	46.65	43.58	47.71	42.63	33.09
11-20 Patients	-9.03	7.07	3.60	0.85	4.57	1.56
	57.29	49.29	46.12	38.18	38.11	33.85
20+ Patients	-5.70	-15.81	-11.52	-7.24	-12.43	-10.52
	34.93	52.18	35.71	32.95	36.41	31.04
Specialty (Treating 100+ Patients)						
General Surgery	3.55	5.42	21.07	1.20	-21.93	-5.14
	63.83	49.74	42.09	53.98	69.11	61.19
Internal Medicine	-9.87	-10.56	-9.52	-4.77	-6.03	-7.50
	47.05	56.37	47.06	41.52	43.75	37.35
Urology	73.98	N/A	N/A	-16.38	11.53	12.37
	17.16	N/A	N/A	11.14	37.53	37.28
Infectious Diseases	1.11	15.41	11.53	10.58	-0.80	5.27
	38.36	45.32	29.49	30.57	34.98	27.86
Unknown	21.10	7.20	6.31	3.02	10.60	9.42
	34.64	25.93	34.51	38.42	24.42	20.31

PROVIDER LEVEL, GLOBAL PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER					
	Standard Deviation					
	Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	All Patients
Percentile Gain/Loss						
Lowest value	-222.44	-177.10	-188.70	-199.79	-192.20	-212.82
1st Percentile	-157.30	-156.55	-156.57	-142.03	-146.16	-140.74
5th Percentile	-84.10	-83.12	-95.54	-80.83	-82.71	-79.05
10th Percentile	-64.92	-56.67	-62.41	-51.44	-57.05	-51.32
25th Percentile	-14.85	-17.21	-30.85	-20.40	-17.32	-12.89
50th Percentile	22.99	18.60	8.14	14.77	16.20	22.09
75th Percentile	48.79	49.19	40.75	45.75	45.89	49.05
90th Percentile	65.31	70.19	58.53	61.69	64.31	68.09
95th Percentile	73.93	75.89	70.72	73.39	73.87	74.29
99th Percentile	82.40	87.39	85.31	85.12	84.66	87.11
Highest Value	91.13	89.02	87.50	90.02	89.17	91.13

Source: 1988 Medicare Part B data, five states.

Exhibit 5-14a

Cancer Treatment Package

PATIENT-LEVEL SIMULATION RESULTS- STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	Weighted Average
ALL FIVE STATES	0.00	0.00	0.00	0.00	0.00	0.00
	61.23	64.23	53.65	63.77	62.06	61.60
GEOGRAPHIC CATEGORIES						
State						
Arizona	0.00	0.00	0.00	0.00	0.00	0.00
	66.54	66.70	57.17	65.41	63.02	63.93
Connecticut	0.00	0.00	0.00	0.00	0.00	0.00
	50.76	64.45	49.21	56.56	64.00	58.37
Georgia	0.00	0.00	0.00	0.00	0.00	0.00
	55.42	56.45	53.06	65.55	55.95	57.76
Kansas	0.00	0.00	0.00	0.00	0.00	0.00
	68.27	63.47	52.79	62.94	65.14	63.68
Washington	0.00	0.00	0.00	0.00	0.00	0.00
	59.65	66.77	54.31	65.26	59.01	60.83
Urbanization						
Urban	-0.43	-0.28	-1.25	0.90	0.23	0.05
	57.76	63.50	53.19	63.43	60.52	60.19
Rural	1.34	0.50	3.03	-2.22	-0.54	-0.08
	71.58	65.66	55.04	64.61	65.46	65.24
Selected MSAs						
Phoenix	-0.79	1.37	-3.08	3.70	-1.78	-0.18
	61.28	64.04	47.93	59.55	60.88	59.56
Hartford	18.01	16.14	7.79	9.33	7.15	10.59
	34.99	48.72	50.16	49.71	56.21	49.50
Atlanta	-12.31	-17.65	-11.76	-3.99	-4.82	-8.07
	47.85	59.59	49.07	70.11	56.95	57.71
Kansas City	15.67	30.65	16.95	22.10	31.55	24.88
	51.56	30.91	45.07	51.33	40.30	44.36
Seattle	9.55	4.97	-11.15	-4.38	-1.08	-0.39
	47.90	56.53	60.88	72.01	57.48	59.32
PATIENT DEMOGRAPHICS						
Age						
Under 65	-7.13	9.26	-5.11	3.93	11.79	4.51
	74.49	71.03	59.11	67.50	50.62	61.76
65-69	-2.66	-3.60	-3.35	-3.42	-3.36	-3.27
	60.87	61.61	52.55	65.25	63.79	62.14
70-74	-2.60	-7.92	0.54	-7.12	-3.09	-4.02
	60.46	67.89	52.14	64.74	65.00	63.02
75-79	7.36	13.28	10.45	10.31	1.58	6.78
	57.58	59.06	55.51	57.43	61.02	58.78
80-84	14.50	0.35	11.10	3.94	5.61	6.88
	66.86	58.27	62.39	64.11	57.42	61.31
85+	-14.68	-12.55	30.09	8.11	18.75	8.35
	41.74	52.41	44.04	60.17	48.50	49.85
Sex						
Male	-1.09	-1.58	N/A	2.03	-5.51	-2.25
	61.97	67.44	N/A	62.60	65.07	64.10
Female	1.64	2.55	0.00	-2.47	4.67	1.78
	60.15	58.51	53.65	65.16	59.05	59.98

PATIENT LEVEL, STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PATIENT Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	Weighted Average
PATIENT DEMOGRAPHICS CONT'D						
Race						
White	0.65	-0.80	0.78	-1.32	-0.59	-0.40
	59.95	64.74	53.13	64.26	62.53	61.66
Non-White	-12.56	12.02	-11.73	18.86	13.18	7.01
	83.75	54.82	60.88	53.23	48.50	57.90
Medicaid Eligiblity						
Not Eligible	-0.56	-0.75	0.94	-0.85	-0.54	-0.47
	61.52	64.95	52.22	64.32	62.39	61.82
Eligible	21.89	14.33	-12.89	22.97	12.15	13.83
	44.44	44.79	70.56	40.83	52.69	49.66
Duration of Treatment						
1 Month	1.40	2.44	-10.37	1.56	-2.11	-1.08
	58.65	69.48	39.50	58.37	78.50	65.19
2 Months	-4.43	-17.53	-7.46	-11.22	-3.68	-7.37
	69.24	70.48	63.23	72.40	68.63	69.20
3 Months	-0.98	2.93	3.61	-18.03	-9.53	-7.19
	59.71	72.44	66.03	76.11	65.37	67.59
4-6 Months	-7.18	-1.96	4.66	-4.66	-1.58	-2.64
	67.68	68.15	56.49	68.98	64.17	65.46
7-12 Months	6.04	4.79	-1.90	5.51	3.43	3.93
	54.86	53.52	48.37	58.34	56.85	55.56
Percentile Gain/Loss						
Lowest value	-293.19	-242.78	-237.12	-242.23	-264.23	-259.25
1st Percentile	-206.01	-202.16	-144.90	-187.75	-189.40	-188.46
5th Percentile	-123.04	-126.55	-108.05	-136.07	-122.63	-124.56
10th Percentile	-75.43	-89.22	-73.47	-93.53	-83.34	-83.76
25th Percentile	-27.44	-36.05	-28.73	-34.85	-33.90	-32.61
50th Percentile	10.23	12.40	9.48	16.51	13.43	13.01
75th Percentile	43.36	50.90	37.86	46.04	46.82	45.46
90th Percentile	64.09	69.49	62.69	68.47	65.50	66.02
95th Percentile	72.94	75.96	70.07	75.68	74.09	74.00
99th Percentile	84.60	88.15	83.83	83.79	83.65	84.34
Highest Value	92.97	94.58	87.35	90.15	89.95	90.73

Source: 1988 Medicare Part B data, five states.

Exhibit 5-14b

Cancer Treatment Package

PROVIDER-LEVEL SIMULATION RESULTS- STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	All Patients
ALL FIVE STATES	0.00	0.00	0.00	0.00	0.00	0.00
	44.55	50.27	41.81	40.41	41.98	36.04
GEOGRAPHIC CATEGORIES						
State						
Arizona	0.00	0.00	0.00	0.00	0.00	0.00
	45.00	56.33	40.06	32.81	39.31	33.56
Connecticut	0.00	0.00	0.00	0.00	0.00	0.00
	38.30	51.79	32.94	31.34	39.54	30.61
Georgia	0.00	0.00	0.00	0.00	0.00	0.00
	42.38	44.04	40.39	45.49	34.82	32.90
Kansas	0.00	0.00	0.00	0.00	0.00	0.00
	49.95	48.95	40.74	38.30	48.56	42.21
Washington	0.00	0.00	0.00	0.00	0.00	0.00
	43.41	48.79	46.04	48.35	38.98	33.87
Urbanization						
Urban	-2.04	1.08	-2.07	-0.24	-0.39	-0.66
	42.47	48.64	41.23	40.34	38.36	32.35
Rural	7.17	-2.48	6.65	0.72	1.09	1.92
	51.04	53.15	42.95	40.57	50.28	44.78
Selected MSAs						
Phoenix	-4.05	-8.95	-6.51	-2.57	-4.03	-4.46
	34.47	51.51	35.10	26.12	35.83	26.02
Hartford	18.05	23.37	7.36	10.58	7.60	12.62
	24.33	36.40	37.69	34.49	36.63	28.44
Atlanta	-7.83	-13.86	-12.73	-7.27	-4.52	-8.14
	36.88	46.30	43.92	52.25	35.49	34.84
Kansas City	20.62	33.72	15.85	22.73	32.91	26.75
	37.37	20.75	37.23	30.03	24.25	25.66
Seattle	11.56	6.52	-13.32	-4.02	-1.73	0.02
	34.02	42.54	47.09	51.38	39.63	31.86
Number of Patients						
1-5 Patients	20.32	28.32	16.76	21.87	14.17	18.39
	49.54	53.93	50.23	48.67	51.21	47.63
6-10 Patients	1.35	-0.11	3.94	-11.90	0.18	-1.82
	44.17	48.56	38.76	49.08	42.82	32.53
11-20 Patients	-7.44	4.14	3.27	0.48	1.89	0.37
	51.43	55.07	42.47	37.24	39.72	33.89
20+ Patients	-6.46	-12.49	-11.48	-6.51	-10.76	-9.44
	32.94	41.21	34.00	29.01	31.44	26.33
Specialty (Treating 100+ Patients)						
General Surgery	0.94	11.61	24.32	-0.47	-13.00	-2.31
	63.19	52.89	42.27	55.81	64.76	59.17
Internal Medicine	-4.21	-3.68	-1.66	-2.14	-3.30	-3.10
	42.00	49.44	41.31	39.20	40.40	33.95
Urology	76.49	N/A	N/A	-23.07	10.15	11.06
	29.58	N/A	N/A	12.75	39.60	39.33
Infectious Diseases	-0.70	2.54	-2.19	0.25	-3.02	-1.09
	39.07	52.21	34.06	34.11	35.75	29.37
Unknown	-2.02	-7.63	-7.14	-1.57	-2.17	-3.57
	44.80	30.07	39.46	40.24	27.91	23.03

PROVIDER LEVEL, STATE-SPECIFIC PAYMENT RATES, TRIMMED SAMPLE, cont'd.

	AVERAGE PERCENTAGE GAIN/LOSS PER PROVIDER Standard Deviation Patient Cohort					
	Digestive	Respiratory	Breast	Blood/Lymph	Other	All Patients
Percentile Gain/Loss						
Lowest value	-164.84	-193.66	-144.88	-213.97	-198.62	-164.84
1st Percentile	-154.17	-166.85	-129.24	-153.48	-141.16	-147.93
5th Percentile	-81.71	-89.56	-84.84	-81.70	-85.93	-86.29
10th Percentile	-54.34	-59.46	-62.19	-55.96	-59.60	-50.51
25th Percentile	-15.72	-18.34	-28.19	-20.56	-18.85	-14.96
50th Percentile	17.10	15.21	6.92	10.62	16.95	16.76
75th Percentile	47.08	45.54	38.25	43.06	45.40	47.98
90th Percentile	65.78	69.46	63.10	66.04	62.31	68.79
95th Percentile	72.69	74.68	68.94	77.11	71.89	73.27
99th Percentile	81.53	87.48	83.81	85.34	85.51	86.64
Highest Value	92.98	91.29	87.17	88.18	89.97	92.98

Source: 1988 Medicare Part B data, five states.

6.0 SUMMARY AND CONCLUSIONS

This study had three specific objectives:

(1) to develop and evaluate several innovative alternatives for multiple visit-based packaging;

(2) to demonstrate the feasibility of episode-type packaging; and

(3) to develop methods and suggest directions for subsequent developmental work in this area.

Let us consider now how well these objectives have been met and what we have concluded relative to each of them.

With regard to the first objective, we have put forward and tested four different approaches to packaging episodes of care. We conclude that at least two of the four package models--podiatric services and cancer treatment--have significant potential for future demonstration projects or program implementation. Although the laser eye surgery package also has significant potential, we nevertheless suggest that another alternative for bundling those services is more attractive. Only cardiac testing may have little or no potential for packaged payment.

While encouraging, our results are nevertheless inadequate to support their application to practical payment arrangements. Without further research and development, we cannot recommend any program adjustments or demonstration initiatives. Our methodology, and results, were significantly shaped and constrained by the lack of diagnostic coding in Medicare's outpatient claims data. Now that diagnostic coding has become available, it becomes imperative to refine and extend our work using these more reliable data. Indeed, we do not believe that any of our package models would be credible without the facility to positively identify those services provided for a given condition or diagnosis. Also, additional developmental work on the staging or categorization of patient severity needs to be done.

Turning to the second objective, we believe that the study provides analytic support for both the feasibility and desirability of episode-based packaging. With podiatric services and cancer treatment, in particular, comparatively large numbers of services are being billed

for each patient, and geographic practice variation is significant. The administrative cost savings alone could make packaged payment worthwhile. For example, rather than paying ten or more bills per month for cancer treatment, Medicare might pay a single capitation amount--and thereby also give incentive to the physician-in-charge to coordinate cancer treatment on a cost effective basis. Whereas our simulation findings indicated a high and probably unacceptable level of provider risk for such payment arrangements, we anticipate that the risk can be reduced to an acceptable level by incorporating patient severity adjustments as appropriate.

Our conclusions with respect to the third study objective are less sanguine. Given our experience with the four package models, we doubt that a more systematic or comprehensive approach to condition-specific packaging can be found. Each of the four models involved unique package definitions, confronted different practice environments, and presented altogether different payment concerns.

We don't anticipate that--other than primary care capitation--it will ever be feasible (or desirable) to develop multiple-visit packaged-based payment arrangments for all or even most outpatient services. Rather, we recommend that outpatient packaging be done on an opportunistic basis, for only a selected subset of conditions and specialties. Furthermore, based on our experience, we anticipate that each package will require customized development, giving focused attention to the clinical and practice dimensions of the condition involved.

This study makes no attempt to project the cost savings associated with packaging. Indeed, we believe that it would have been premature to do develop such estimates. Although better data will unquestionably help, we nevertheless question whether the cost savings potential of packaged payment can be reliably determined apart from some kind of market or demonstration test. It would have been extremely difficult, for example, to gauge the value of capitating primary care physicians if no one had ever done it before. We simply don't understand either physician behavior or clinical practice well enough to anticipate the utilization and cost impacts.

In brief, we summarize our findings and conclusions relative to the four package models as follows. Podiatric services has the strongest near-term potential for either demonstration testing or program implementation. Our work needs only to be replicated,

using diagnostically-coded claims data, and perhaps extended to a 12-month interval. However, a further investigation of the patient stratification alternatives may also be indicated.

Until HCFA has gained more experience in this area, we would limit any packaged payment arrangements to the higher volume providers and their existing patient panels. The former restriction would limit financial risk to the providers involved, and the latter would mute package incentives to expand the package patient population. However, a variety of administrative and possibly legal questions remain to be answered. Thus, it is also necessary to develop, in consultation with HCFA program personnel and podiatric providers, a practical strategy for implementing packaged payment.

Cancer treatment has considerable, longer-term potential for packaged payment. However, in the short run, extensive work needs to be done in developing and evaluating alternative methodologies for risk-adjusting the payment rates, and thereby improving the overall equity and efficiency of packaged payment. The National Cancer Institute's cancer staging methodology is one such alternative to be investigated.

The simulation results for laser eye treatment of after-cataract patients were actually quite good. However, we are concerned that neither the patient volumes nor the package costs are adequate to justify packaged payment. It probably makes more sense to bundle the treatment of after-cataract sequelae with the cataract procedure itself. The distributional consequences of so doing should be determined using the newly-available, diagnostically-coded claims data.

Finally, we conclude that cardiac testing has no ready potential for packaged payment. Practice variation is substantial, and there seems to be no clinical basis for risk-adjusting the payment rates. Before bundled payment can go forward in this area, clinicians must first reach consensus on the indications for and intensity of cardiac testing. Unlike podiatric services, cardiac testing can have "life and death" consequences, and we are less willing to recommend experimentation with the payment incentives in this area. Nevertheless, it may be instructive to replicate our work using diagnostically-coded claims data.

The salient limitation of this investigation was its inability to incorporate diagnostic information in the development and appraisal of packaging alternatives. This was a very

serious limitation indeed, and it unquestionably clouds prospects for success in endeavors of this type.

On the other hand, the major strength of this study was its comparative success in the face of such adversity. We have clearly shown that multiple visit-based packaging alternatives have significant potential. Methodological limitations aside, our study gives significant impetus to more sophisticated developmental efforts, especially ones utilizing diagnostic data.

REFERENCES

Averill, Richard F., Norbert I. Goldfield, Thomas E. Mcguire, Judith A. Bender, Robert L. Mullin, and Laurence W. Gregg, Design and Evaluation of a Prospective Payment System for Ambulatory Care, 3M Health Information Systems, December 31, 1990.

Carter, Grace M., and Glenn A. Melnick, How Services and Costs Vary by Day of Stay for Medicare Hospital Stays, RAND, 1990, (propac).

Ellis, Randall P., and Thomas G. McGuire, "Insurance Principles and the Design of Prospective Payment Systems," Journal of Health Economics, 1988 (7):215-237.

Escarce, Jose J. Effects of the Relative Fee Structure on the Use of Surgical Operations under Medicare, presented at Workshop on Behavioral Responses to the Implementation of the New Medicare Physician Payment Schedule, Arlington VA, November 15, 1990.

Health Care Financing Administration, Special Report, Hospital Data by Geographic Area for Aged Medicare Beneficiaries: Selected Diagnostic Groups, 1986: Volume 1, HCFA Pub. 03300, June 1990.

Keeler, Emmett B., Grace M. Carter, and Sally Trude, "Insurance Aspects of DRG Outlier Payments," Journal of Health Economics, 1988 (7):193-215.

Lee, James, Randall P. Ellis, and Angela Merrill, Focused Analysis of Post-Acute Care (PAC) Use for Selected DRGs, Final Report, HCFA Cooperative Agreement No. 99-C-98526/1-08), 1992.

Mitchell, Janet B., "Physician DRGs" New England Journal of Medicine, 1985 (313):670-675.

Mitchell, Janet B., Jerry Cromwell, Kathleen A. Calore, and William B. Stason, "Packaging Physician Services: Alternative Approaches to Medicare Part B Reimbursement," Inquiry, 1987 (24:4):324-340.

Mitchel, Janet B., Robert C. Boutwell, and Jonathan Bogen, Packaging Diagnostic Test Interpretation and Surgical Procedures, with Office Visits, HCFA Cooperative Agreement No. 99-C-985261-04, April 1989.

Mitchel, Janet B., and Margo L. Rosenbach, "Feasibility of Case Based Payment for Inpatient Radiology, Anesthesia, and Pathology Services," Inquiry, 1989 (Winter).

Mitchell, Janet B., and Brooke Harrow, Global Fees for Surgery, HCFA Cooperative Agreement No. 99-C-98562/1-05, October 1990.

Mitchell, Janet B., and Randall P. Ellis, "Alternative Payment Systems for Hospital Medical Staffs," Inquiry, 1992, forthcoming.

Schneeweiss, Ronald, Roger A. Rosenblatt, Daniel C. Cherkin, C. Richard Kirkwood, and Gary Hart, "Diagnosis Clusters: A New Tool for Analyzing the Content of Ambulatory Medical Care," Medical Care, 1983 (1):105-122.