Parity for Oral and Intravenous/Injected Cancer Drugs

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Technology continues to change the nature of medical treatment, and a number of new, innovative, and often costlier treatments have emerged for serious diseases such as cancer. However, these new treatments may be viewed skeptically by those who ultimately shoulder the costs, payers and employers, who need to control healthcare costs. Payers use a variety of techniques to control costs including utilization management and increased member cost sharing. Employers have increased patient out of pocket responsibilities or required higher employee contributions; the former has the member pay more for care received, while the latter reduces net wages.

In certain instances, technology has outpaced payer and employer management of healthcare benefits. This issue has become evident with the emergence of orally-administered anticancer agents. Because of how benefit designs have evolved, intravenous/injected chemotherapy drugs are typically covered through medical benefits, while oral chemotherapy drugs are most often covered through pharmacy benefits. Medical benefits often bring relatively low cost burdens to patients for chemotherapy because they may require only an office visit copay or have a cap on out-of-pocket expenditures. In contrast, pharmacy benefits can be more burdensome for patients as some designs require unlimited cost sharing, for example, 25% of the drug price with no cap on out of pocket expenses. Such pharmacy benefit structures can make high cost oral anticancer medications unaffordable.

This research report examines the concept of "parity" between oral and infused drugs – in particular, equalizing patient cost-sharing for all chemotherapy drugs regardless of formulation. Treatment choice is, of course, complex. In addition to medical effectiveness and safety, financial considerations figure prominently for the provider, payer and patient. The cost sharing inequity in some plan designs for intravenous/injected and oral chemotherapy products is becoming more apparent as high-cost oral products come to market with many more under development. The benefit design issue we address here will likely continue to grow in importance.

Several state legislatures have passed or are considering "parity" legislation that would require state-regulated payers to cover oral chemotherapy drugs with the same cost sharing as intravenous/injected chemotherapy drugs. This paper addresses a particular benefits issue – how much parity legislation might cost a payer.

As described in the body of the text, for most benefit plans, parity will cost under $0.50 Per Member Per Month (PMPM), which compares to a typical commercial plan cost of over $300 PMPM for all benefits. However, there are literally thousands of benefit design variations, and plan design features can affect parity costs. Parity for some plan designs with very high cost sharing for oral specialty drugs and low cost sharing for medical benefits could cost about $1.00 PMPM, or, in unusual circumstances, more. Parity for other plan designs that have low overall cost sharing could cost as little as $0.05 to $0.10 PMPM.

In addition to our parity cost estimates, significant new findings presented here include estimates of elasticity for oral chemotherapy drugs – how increasing cost sharing reduces the consumption of higher cost oral chemotherapy drugs. This elasticity for chemotherapy drugs is a finding that hasn't previously been published.

This paper presents models and assumptions that a payer can consider to estimate the impact of parity for oral and intravenous/injected chemotherapy. We do not address administrative costs associated with parity. Development of insurance rates is, of course, the domain of actuaries, and actuaries with appropriate expertise should be involved in any rate calculation.

We note that our assumptions and analysis are general and do not presume any particular therapy. Similarly, we do not address the efficacy or safety of different therapies. In authoring this paper, the authors and Milliman are making no endorsement of any product or policy.

GlaxoSmithKline, a pharmaceutical company that manufactures, markets, and is developing intravenous/injected and oral chemotherapy drugs, commissioned Milliman to develop and author this paper. GlaxoSmithKline provided oncology disease state and treatment expertise, background information on iv/oral chemotherapy treatment paradigms, information on the current status of oral/iv parity legislation, and the general editing of these sections.

BASICS OF CANCER DRUGS FROM THE STANDPOINT OF BENEFIT DESIGN

Primer on Cancer Chemotherapy

Anticancer drug therapy is one of the three pillars of cancer treatment along with surgical treatment and radiation therapy. Anticancer drug therapy is generally categorized into three types; cytotoxic agents, biologic agents and hormonal agents. These categories include both oral and intravenous/injectable products. Treatment recommendations depend on the type and stage of cancer, along with patient characteristics.

Cytotoxic agents are the traditional therapies that damage cancer cells by interfering with cellular division but have the drawback of killing healthy cells along with cancer cells. Major types of cytotoxic agents include alkylating agents, antimetabolites, and plant alkyloids. Biologic agents, also called targeted agents, target specific cancer biologic pathways. Hormonal therapy interferes with hormone dependent pathways that promote the development or growth of cancer cells and plays an important role in treating breast and prostate cancers.

Historically, intravenous therapies have been the predominant route for administering anticancer drug therapy. Although oral cytotoxic and hormone products have been available for decades, the past 10 years has seen accelerated development of oral anticancer drugs, particularly biologics. Experts estimate that more than one quarter of the 400 chemotherapy drugs now in the development pipeline are planned as oral drugs.[1]

Evidence based treatment guidelines, including those issued by the National Comprehensive Cancer Network (NCCN)[2], recommend various combinations of chemotherapy depending on the particular cancer and stage. These recommendations are made without regard to the route of administration. Protocols may recommend a single oral or single infused treatment protocol, a combination of infused products only, and oral and infused product combinations. For a few treatment protocols, NCCN guidelines indicate an oral product or an infused product as being potentially substitutable.

Cytotoxic products, which are predominantly given by intravenous infusion, are generally administered episodically to deliver the maximum tolerated dose to optimize cell kill in a single episode. The interval between doses allows for recovery from potential side effects. Biologic products are optimally effective when taken chronically, often daily, to continuously expose the tumor cells and tumor microenvironment to the drug therapy. This goal of chronic administration is consistent with the convenience of oral administration when available. There are pros and cons to each option, cytotoxic or biologic, intravenous or oral, which need to be weighed by patients and healthcare providers.[3] [4]

Overview of Cancer Drug Coverage and Benefit Designs

Infused and oral medications typically have different dispensing sites, and the dispensing site often defines which portion of a health benefit applies. Intravenous medication, most often administered in a physician's office or hospital outpatient infusion center, is generally covered as a physician service or hospital outpatient service and defined as medical benefits. Oral anticancer medication is typically dispensed by a pharmacy and covered under a pharmacy benefit. Injectable anticancer medication may be self administered and covered under a pharmacy benefit or administered in a physician's office or outpatient hospital setting and covered under a medical benefit. On average, as a percent of all covered medical benefits, average patient cost sharing for a typical medical benefit is lower, and cost sharing for the prescription benefit as a percent of covered prescription benefits is higher.

THE COST AND UTILIZATION IMPACT OF PARITY FOR ORAL CANCER DRUGS

Defining Parity

The term "parity" for health benefits has most prominently referred to requiring coverage for mental health and substance abuse services on the same basis as medical benefits. Traditional benefit designs covered mental health and substance abuse services with higher cost sharing (for example, 50% coinsurance) and "inside" limits (for example, 20 visit annual maximum) that meant less coverage than for other services.[5] Parity legislation passed in the 1990s applied only to benefit maximums, and full parity was signed into law in October 2008.[6] [7]

State parity legislation for oral chemotherapy drug coverage typically requires that insurance coverage for orally administered chemotherapy medications shall be provided on a basis no less favorable than coverage for injected or intravenously administered chemotherapy medications. For the purpose of this report, we define oral/intravenous/injected chemotherapy parity to mean that the percent patient cost sharing for an oral chemotherapy drug will be no more than that of an intravenous/injected chemotherapy drug. We apply the following algorithm:

Definition of Oral/Intravenous/Injected Chemotherapy Parity

For an individual who receives both oral and intravenous/injected chemotherapy drugs, the percent cost sharing for the oral chemotherapy drugs will be no more than the percent cost sharing for their intravenous/injected chemotherapy drugs.

For an individual who receives only oral chemotherapy drugs, the percent cost sharing for the oral chemotherapy drugs will be no more than the average percent cost sharing for the intravenous/injected drugs as administered by their benefit plan.

Traditional prescription drug designs, with fixed copays, such as $25 or $40 per script, do not impose large cost sharing for expensive drugs. However, some plan designs with unlimited coinsurance, for example 25% or 33% or higher, can impose a significant cost sharing burden when the prescription costs thousands of dollars, which is not an unusual cost for a chemotherapy product whether it is intravenous/injected or oral.

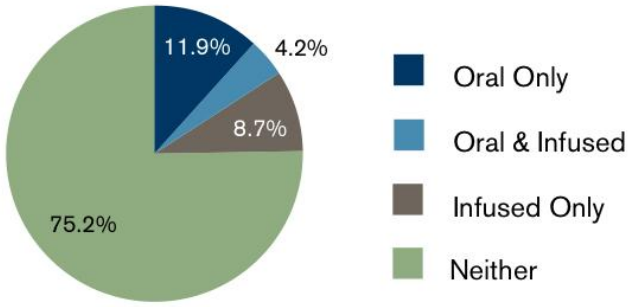
Many medical benefit designs offer some form of cap on member out-of-pocket costs. The trend toward prescription drug benefits with unlimited coinsurance, together with the introduction of often expensive oral agents, has made intravenous/injected-oral parity an issue.

In our analysis, we do not address administrative costs and assume parity does not affect utilization management strategies such as prior authorization, quantity limits and restricted formularies.

Cancer Patients and Utilization of Chemotherapy

Using the approach described in the Methodology section, we estimate approximately 1.5% of a commercially insured population has medical claims for cancer in a one year period. Although chemotherapy is a significant treatment option for cancer patients, most patients with a cancer diagnosis do not receive chemotherapy in a year. Figure 1 provides the distribution of cancer patients by chemotherapy treatment showing about 25% of cancer patients receive chemotherapy during a year. The remaining three-quarters of patients may be treated using a variety of other non-chemotherapeutic treatment modalities, such as surgery, radiation therapy or monitoring.

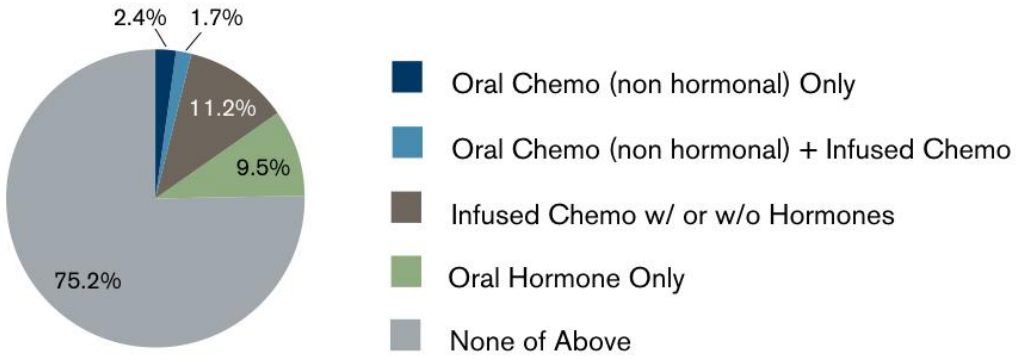
Figure 1: Distribution of Cancer Patients by Chemotherapy Treatment



N = 172,547 cancer patients. Excludes basal cell skin cancer
Source: Milliman's work on MedStat Commercial 2007

Figure 2 shows the distribution of patients by the kinds of cancer drugs (hormonal, non-hormonal, oral, infused) they take in one year. Almost half of patients receiving chemotherapy use oral products only, and most of that usage is hormonal agents which are generally low cost. Of those cancer patients receiving chemotherapy treatment, only 17% (2.4% plus 1.7% out of 24.8%) receive chemotherapy that does not include hormonal treatment.

Figure 2: Distribution of Cancer Patients by Type of Chemotherapy



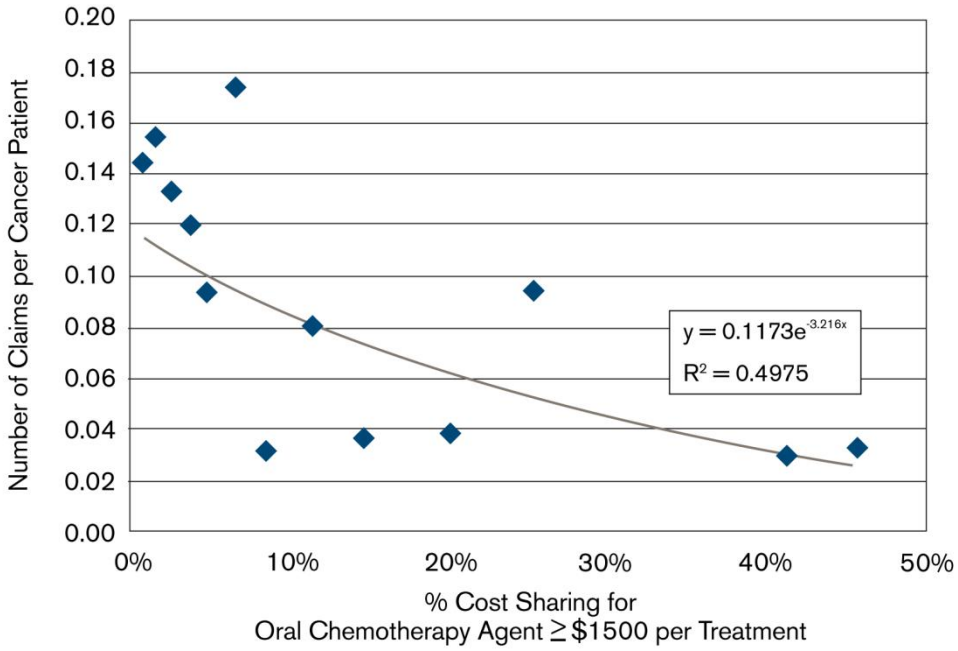
N = 172,547 cancer patients. Excludes basal cell skin cancer
Source: Milliman's work on MedStat Commercial 2007

How Benefit Cost Sharing Impacts Cancer Drug Use: Elasticity

Higher out-of-pocket costs discourage the use of medical services and products, and this has been shown for high-cost pharmaceuticals.[8] In particular, we demonstrate that higher cost sharing for oral chemotherapy agents is associated with lower utilization of these drugs. This is shown in Figure 3 below, which is based on examination of the medical claims of thousands of cancer patients. Our finding contrasts with other studies, which have assumed no price elasticity.[9]

The diamonds in Figure 3 correspond to different plan designs, each diamond representing a distinct percent cost share for oral chemotherapy drugs. The chart shows an inverse relationship between the percent cost sharing, and number of claims per patient. In other words, higher percent cost sharing leads to fewer claims per patient for oral chemotherapy. The formula in the chart shows the elasticity function fitted to the data points, along with the corresponding R^2 value. The data sources and approach we used is described in the Methodology section.

Figure 3: Relationship Between % Cost Share or Oral Cytotoxic Rx and Number of Oral Cytotoxic Claims Per Cancer Patient Age 20-69



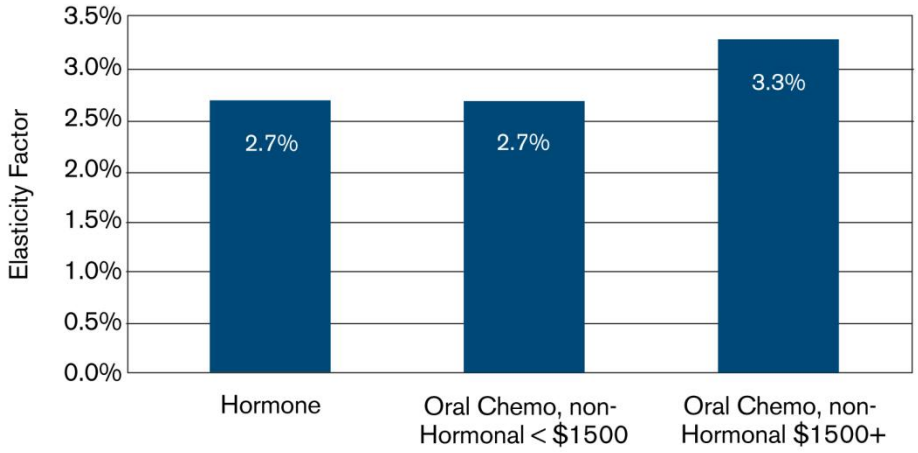
N = 24,474 cancer patients spread among 13 cost-sharing categories. Source: Milliman's analysis of MedStat Commercial 2007, 2008Q1-3 and Milliman proprietary data from 2007. Oral chemotherapy category does not include hormonal therapies. The box shows the best fit of a typical elasticity curve.

These data suggest that oral/intravenous/injected chemotherapy parity will increase drug utilization, which will increase cost.

In economics, elasticity measures the sensitivity of one variable to another, which is the percentage change that will occur in one variable in response to a 1-percent increase in another variable[10]. Actuaries have long recognized that higher cost sharing reduces utilization, and typical actuarial practice recognizes this phenomenon in setting premium rates for health insurance products.

In Figure 4, we show the elasticity factors of three types of oral chemotherapy drugs: hormonal agents, less expensive non-hormonal agents (under $1500 per claim), and more expensive non-hormonal agents ($1500 or more per claim).

Figure 4: Elasticity: % Utilization Caused by 1 Percentage Decrease in % Cost Share for Oral Cancer Drugs



Source: Milliman analysis of MedStat Commercial 2007, 2008Q1-3
Milliman Health Cost Guideline 2009

In Figure 4, elasticity means the percent increase in utilization caused by a 1 percentage point decrease in cost sharing. For example, the elasticity factor of 3.3% applies to oral chemotherapy, non hormonal drugs costing $1500 or more. The 3.3% elasticity factor shown means if the percent cost sharing for the drug goes down from 20% to 19%, the utilization of these drugs will increase by 3.3%. The 3.3% elasticity factor is consistent with Figure 3 and further described in the Methodology section. For the hormones and lower cost oral chemotherapy drugs, we used standard actuarial elasticity factors.

Cost Impact of Parity for Oral Cancer Drugs for Various Benefit Designs

We applied the elasticity relationships described above to estimate the additional drug cost of parity. It is impossible to define one cost for parity that will apply to all benefit designs, because variations in plan design have a significant impact. Plans vary in the amount of cost sharing for medical and pharmacy benefits, and they vary in how that cost sharing is arranged – copays, coinsurance, deductibles, out-of-pocket maximums, etc. Therefore, to show the additional costs of oral/intravenous/injected parity, we developed ranges and characterizations of health benefit designs.

To put plan cost sharing into perspective, we offer the following:

- A typical PPO benefit design has average cost sharing of 17% across all benefits[11]
- A typical, 3-tier drug benefit, $10/$25/$40 has average cost sharing of 25% across all drugs[12]

Oral/intravenous/injected parity costs depend on both the oral chemotherapy drug cost sharing and the intravenous/injected drug cost sharing, because parity reduces the oral cost sharing to the level

of the intravenous/injected cost sharing. In general, the cost of parity follows the relationships below:

Pre-Parity Benefits	Cost of Introducing Parity
Low cost sharing for oral chemotherapy drugs	Lower Cost to Plan
High cost sharing for oral drugs and Low cost sharing for intravenous/injected chemotherapy drugs	Higher Cost to Plan

If cost sharing for oral chemotherapy drugs is already low, as is the case with traditional prescription drug benefit designs with copays, parity will have only a small cost impact. However, for plans with unlimited coinsurance for expensive drugs, parity can add modest amounts to plan costs.

To present concrete examples of the impact of parity, the authors simulated the impact of oral/intravenous/injected parity for a variety of benefit designs using the definition of oral/Intravenous/Injected chemotherapy parity stated at the beginning of this section. The simulation was done for each patient taking oral chemotherapy, including hormonal agents. We simulated parity for over 60 benefit designs which comprised over 32 million member months and 43,000 cancer patients. We segmented the benefit designs into three categories, with the medium category typical of traditional PPO designs[13] and the high category including Consumer Driver Health Plans:[14] We show sample medical and prescription drug benefits for the ranges of cost sharing in the tables below:

Sample Medical Benefit by Cost-Sharing Level

Cost Sharing Level	Effective Average Coinsurance	Sample Medical Benefit
Low	Under 12%	$100 deductible, 15% coinsurance, $1,500 out-of-pocket maximum
Medium	12% to 17%*	$200 deductible, 20% coinsurance, $1,500 out-of-pocket maximum
High	Above 17%	$400 deductible, 20% coinsurance, $2,000 out-of-pocket maximum

*Close to a typical PPO benefit design.

Sample Prescription Drug Benefit by Cost-Sharing Level

Cost Sharing Level	Effective Coinsurance for Expensive Oral Drugs	Sample Drug Benefit
Low	Under 5%	$10/ Generic/$25 Preferred Brand/$40 Non-Preferred Brand (including Specialty)
Medium	5% to 10%	$10 Generic/$25 Preferred Brand/$40 Non-Preferred Brand/10% coinsurance Specialty
High	Above 10%**	$10 Generic/$25 Preferred Brand/$40 Non-Preferred Brand/25% Coinsurance Specialty

**Typical for benefits with coinsurance in a 3rd or 4th tier or specialty tier

We used the average cost sharing for medical benefits as an indicator of intravenous/injected drug cost sharing, because the deductible and coinsurance and out-of-pocket limits typically apply to intravenous/injected drugs.

The extra plan costs for parity are relatively small, as shown in the following table. The extra costs are shown Per Member Per Month (PMPM):

Extra Plan Cost of Parity Benefits in $PMPM (Costs Trended to 2009)

		Oral Chemotherapy Cost Sharing Percentage		
		Low	Medium	High
Medical Benefit Cost Sharing Percentage	Low			$0.50 to $1.30
	Medium	$0.05 to $0.10	$0.15 to $0.20	$0.25 to $0.35
	High			$0.20 to $0.30

These figures do not include plan administrative costs. These figures compare to a PMPM claim cost of $319 for a typical commercially insured individual based on Milliman's 2008 Group Health Insurance Survey, trended to 2009 dollars.

Decreased cost sharing will increase the cost of oral chemotherapy in several ways. We list these with the estimated most expensive listed first:

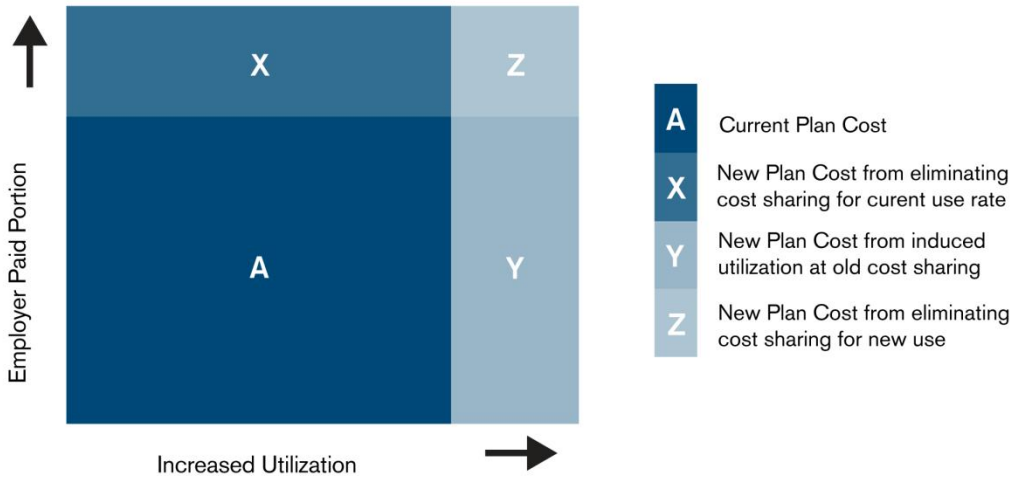
- The plan will pay for the difference in cost sharing for people who would have paid the original cost sharing.
- The plan will pay for the new utilization (induced utilization) that members would have avoided because of the original cost sharing. We divide this into two pieces:
    - The new services at the old price assuming cost sharing
    - The reduced cost sharing for the new services

In addition, there may be reduced recoveries through coordination of benefits (COB). Reduced cost sharing may encourage some employed spouses or dependents to obtain coverage from the plan with lower cost sharing. We did not attempt to quantify these two factors as they vary greatly with each employer's particular situation.

We also made no adjustment for changes in the utilization of intravenous/injected chemotherapy, as our analysis did not indicate an impact on intravenous/injected chemotherapy associated with increased utilization of oral chemotherapy.

Figure 5 shows the elements of increased costs (other than COB).

Figure 5: How Reducing Cost Sharing Increases Payer Cost (Elasticity)



The relative contribution of each component will vary with benefit design details.

Case Study Cost Comparison: Injectable versus Oral Chemotherapy

In general, care rendered in less intensive settings (such as home) is less expensive than care rendered in facilities or physician offices, which has led to widespread promotion of outpatient services as an alternative to inpatient services.[15] The possibility that some chemotherapy can be administered orally instead of intravenous/injected raises the potential for cost reduction in cases where oral or infused products are therapeutically similar. For many services, facility or physician office sites can involve services and costs beyond the particular drug, its acquisition cost, or the principle services being rendered.

Although both oral and infused treatment options require close monitoring and follow up, infused therapies incur costs associated with IV administration. Several studies report costs associated with infused chemotherapy, although the reported costs vary. A study of the costs of IV administration in a metastatic breast cancer population identified chemotherapy per visit costs of $2,477, with IV administration accounting for approximately 10% ($252); the study drug accounting for 59% ($1,463); and other drugs and services accounting for 31% ($763).[16] Another study of chemotherapy cost for small cell lung cancer patients reported a cost per chemotherapy visit of $787, with 50% of the cost for the IV chemotherapy drug ($395); 12% of the cost for IV chemotherapy administration procedures ($93); and 38% for other visit related drugs and services ($300).[17]

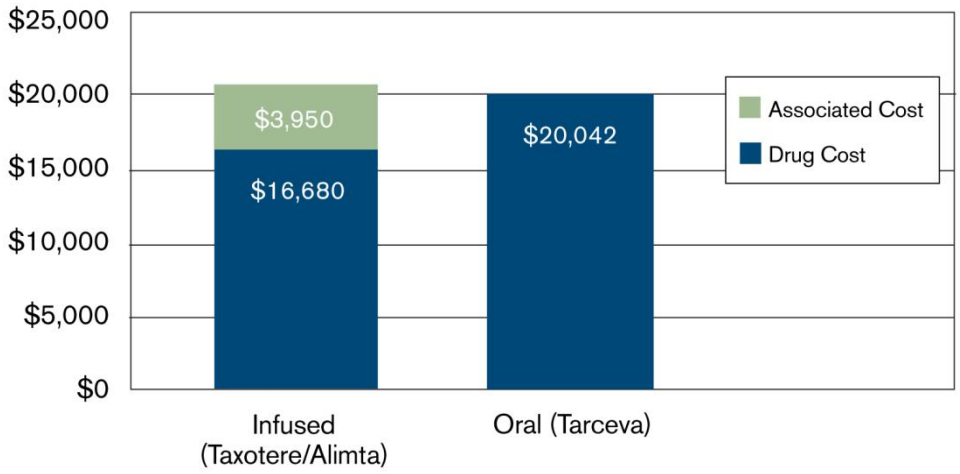
Currently, there are only a handful of cancer treatments with oral or infused chemotherapy options, although a number of oral chemotherapy drugs are in development. To compare the costs of oral and intravenous/injectable administration in a case where there are oral or intravenous/injectable options, we examine the case of non small cell lung cancer where NCCN guidelines recommend treatment with one of infused Taxotere or infused Alimta or oral Tarceva.[18]

Using Medstat 2007 and Q1-Q3 2008, we identified members coded with lung cancer and having one or more claims for Taxotere, Alimta or Tarceva. We identified the average number of treatment claims per patient and the average drug cost per treatment to calculate a course of therapy drug cost. The average number of claims was 4.8/patient for Taxotere and Alimta and 4.9/patient for Tarceva. The intravenous/injected drugs accounted for 63% of the claims while the oral accounted

for 37% of the claims. We identified the associated infusion costs incurred on the day of infusion administration by performing a claim line examination and determined costs that would go away if the infusion did not occur.

Although the average acquisition cost of Taxotere/Alimta is lower than Tarceva, the associated infusion costs move the total average costs somewhat higher than for patients on the oral product Tarceva (see Figure 6). We did not factor in nonpayer costs that may be incurred with oral administration including additional education on drug administration, compliance and side effects. In this case, the costs of infused and oral therapy appear to be very close. Because oral chemotherapy is sometimes combined with infused agents, and because oral and infused agents are not often directly substitutable, we believe the hypothesis of cost reduction by avoiding infusion-related costs is unproved through this example. We did not attempt to compare clinical outcomes for this case. Figure 6 summarizes our findings.

Figure 6: Allowed Cost Comparison Per Course of Therapy
(Total cost paid by payer and member)
(Average Number of Claims/Patient)



N= 270 patients; Infused Taxotere and Alimta
N =154 patients; Oral Tarceva
Source: Milliman's work on MedStat 2007, 2008Q1-3
Costs trended to 2009
Lung cancer patients identified with one IP, one ER or 1 physician claim coded with ICD-9 162.xx

IMPLICATIONS FOR PAYERS AND EMPLOYERS

Oral/Infused Parity Legislation

In 2007, Oregon was the first state to pass oral/intravenous/injectable chemotherapy parity legislation - Senate Bill 8 (SB 8). This legislation requires that:

> "A health benefit plan that provides coverage for cancer chemotherapy treatment must provide coverage for a prescribed, orally administered anticancer medication used to kill or slow the growth of cancerous cells on a basis no less favorable than intravenously administered or injected cancer medications that are covered as medical benefits."

Several advocacy organizations, including the National Patient Advocate Foundation[19] and the American Cancer Society[20,] have taken an active role in supporting similar legislation in other states. Since the beginning of 2009, oral/infused chemotherapy parity legislation has passed in five states (Indiana, Hawaii, Vermont, Iowa, and the District of Columbia) and has been introduced in 20 other states.

State insurance legislation typically amends insurance laws. The state Insurance Commissioner is usually required to convert the intent of an Act into rules and regulations that can be put into practice by insurers and used by the regulators to test insurers for compliance. Seemingly simple parity language like, "no less favorable to an insured," can be interpreted by regulators in different ways. For example, if a patient receives both infused and oral drugs, parity could mean the insured should pay the same percent cost sharing or the same dollar cost sharing. Suppose the infused drug cost $1000 with 5% cost sharing ($50), and the oral drug cost $2000. Parity could mean the same 5% cost sharing or $100 for the oral drug (the same percent), or it could mean $50 cost sharing (the same dollar amount). As with other features of state insurance regulation, mandates for oral/infused parity are likely to be implemented in ways that vary by state.

Federal legislation to amend the Employee Retirement Income Security Act (ERISA) and other acts has been introduced by Representative Brian Higgins (NY) in May 2009.[21] HR 2366 would require "group and individual health insurance coverage and group health plans to provide for coverage of oral cancer drugs on terms no less favorable than the coverage provided for intravenously administered anticancer medications." ERISA, not states, governs self-insured health benefit plans, which is why this proposal and other federal mandates are structured as amending ERISA.

Impact on Large Employers

Most benefit designs will have low parity costs, especially for programs sponsored by large employers. The member cost burden challenge with oral/infused cost sharing is most pronounced when specialty or high-cost drugs are subject to coinsurance. A 25% coinsurance for a $100 drug is $25, which is a typical cost sharing amount for a brand prescription. However, 25% for a drug that costs $10,000 is $2,500, and such cost sharing can quickly become unaffordable for many people. Such high cost-sharing for expensive prescription drugs is today relatively uncommon among large employer-sponsored programs. According to a recent survey, only 14% of large employers have drug programs with coinsurance.[22] For large employers this information may be most relevant to those considering shifting to a specialty tier design.

Conclusion

The expected continued growth of specialty pharmaceutical products, some of which are very expensive, has prompted an array of benefit design and benefit management techniques.[23] Some insurers and employers are responding to this increasing cost pressure by increasing member cost share through benefit designs with unlimited coinsurance for expensive products, sometimes called

a specialty tier.[24] While such benefit designs may be lower cost to the payer, they can impose a significant cost burden on members and may limit the physician and patient choice of treatment. Oral/infused parity will increase costs the most for payers with benefit designs that include such a specialty tier.

The costs and methodology shown in this paper should be used as guides for employers or insurers who want to calculate parity costs for their own programs. Under reasonable scenarios, the additional costs of oral/infused parity are minimal -- an increase estimated at well below $1.00 PMPM for typical benefit plans that cost over $300 PMPM (claims costs only). Actual costs will, of course, fluctuate from year to year and employer to employer depending on the therapies individuals receive and the treatments that become available.

If oral/infused parity legislation follows the same pattern as mental health parity, medical management and contract management will continue[25] which is our assumption in estimating costs. Typically, for specialty pharmacy, this includes prior authorization, concurrent review, and medical appropriateness reviews as well as encouraging use of preferred providers or contracted specialty pharmacies.[26] Such techniques may become more important because of parity legislation. Managing oncology treatment overall is the subject of increasing payer attention.

APPENDIX A: DESCRIPTION OF KEY DATA SOURCES AND THEIR APPLICATION

Thompson Reuters Medstat database. This dataset contains all paid claims generated by over 20 million commercially insured lives. Member identification codes are consistent from year-to-year and allow for multi-year longitudinal studies. Information includes diagnosis codes, procedure codes and DRG codes, NDC codes along with site of service information, and the amounts paid by commercial insurers. For this study, we used Medstat 2007 through 3rd Quarter 2008.

Milliman's 2009 Health Cost Guidelines. The Guidelines provide a flexible but consistent basis for the determination of health claim costs and premium rates for a wide variety of health plans. The Guidelines are developed as a result of Milliman's continuing research on health care costs. First developed in 1954, the Guidelines have been updated and expanded annually since that time. The Guidelines are continually monitored as they are used in measuring the experience or evaluating the rates of health plans, and as they are compared to other data sources. The Standard Demographics in the Guidelines were developed to be representative of the age and sex distribution for a typical large insured group. The Standard Demographics were developed using data from large insurers combined with Department of Labor Sources. We use the Guidelines to demographically adjust our target population to a typical working age population.

Milliman Medical Index (MMI). The MMI examines key components of medical spending and the changes in these components over time. The MMI incorporates proprietary Milliman studies to determine representative provider-reimbursement levels over time, as well as other reliable sources, including the Kaiser Family Foundation/Health Research and Educational Trust 2007, *Annual Employer Health Benefit Survey* (Kaiser/HRET), to assess changes in health plan benefit level by year. The MMI includes the cost of services paid under an employer health-benefit program, as well as costs paid by employees in the form of deductibles, coinsurance, and copayments. The MMI represents the total cost of payments to healthcare providers, the most significant component of health insurance program costs, and excludes the non-medical administrative component of health plan premiums. The MMI includes detail by provider type (e.g., hospitals, physicians, and pharmacies), for utilization, negotiated charges, and per capita costs, as well as how much of these costs are absorbed by employees in the form of cost sharing. We used the annual MMI cost trends to trend the MedStat cost data to 2008 dollars.

Milliman Group Insurance Survey™ (GIS). The GIS measures premiums and experience of HMOs and PPOs based on a uniform population and benefit design. The Survey provides statistics on fully insured HMOs and PPOs that serve the commercial large or midgroup market. Companies use the Survey to benchmark their financials to the competition. HMO and PPO results are presented separately by metropolitan statistical area (MSA), state, region, and nationwide. The results are based on questions answered by at least three companies. Company identities are kept strictly confidential.

APPENDIX B: METHODOLOGY

Cancer Identification

We identified an individual as having cancer if they had one inpatient, one ER or 2 or more physician claims on separate days coded with the following ICD-9 codes in any position of the claim:

140.xx through 172.xx
174.xx through 208.9x

Of people identified with cancer claims, we identified patients receiving one or more oral and/or intravenous/infused chemotherapy drug using NDC and J codes. The complete list of chemotherapy drugs is available upon request to the authors.

Methodology for Elasticity Calculation

Data Sources

The following data sources were used in this research:

- Milliman *Health Cost Guideline 2009* for Hormonal drugs and Oral Chemo drugs costing less than $1500 per claim
- MedStat Commercial 2007 and 2008Q1-3 for Oral Chemo drugs more than $1500 per claim

Hormonal drugs and Oral Chemo drugs costing less than $1500 per claim

We used standard actuarial coefficients and the average allowed and cost share for both Hormonal drugs and Oral Chemotherapy drugs with allowed amounts less than $1500 per claim. These factors, which are not specific to hormonal drugs or oral chemotherapy drugs show that a 1 percentage point reduction in cost sharing produces a 2.7% increase in utilization. The following table shows the average allowed amounts for these two categories.

	Hormone	Oral Cytotoxic <$1500
Average Allowed Amount per Claim	$307	$400

The average allowed are from our analysis of MedStat for 2007 and 1Q-3Q 2008.

Oral Chemotherapy drugs costing more than $1500 per claim

We developed the elasticity factor for oral chemotherapy drugs costing more than $1500 per claim using MedStat Commercial 2007, 2008Q1-3 and Milliman's proprietary database with 2007 data. For purposes of calculating elasticity, we selected benefit designs with relatively low intravenous/injected drug cost sharing (greater than 2.5% and less than 5.5%") and grouped benefit designs based on similar ranges of oral chemotherapy cost sharing. We then used regression analysis to develop a best fit elasticity curve between,

y : Number of oral non-hormonal chemo claims per cancer patient

x : % Cost Share of oral non-hormonal chemo claims

We found

$$y = 0.01173e^{-3.216x}$$, with R^2 = .4975

Base on the formula above, the elasticity, which is % utilization increase caused by 1 percentage point decrease in % cost share, is calculated as,

$$\frac{0.01173e^{-3.216(x-1\%)}}{0.01173e^{-3.216x}} - 1 = e^{3.216\times 1\%} - 1 = 3.3\%$$

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