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Employment or Leadership Position: José Luis González, Association of Northern California Oncologists (C) **Consultant or Advisory Role:** Roberta Buell, Genentech (C), Celgene/Abraxane (C); Patricia Falconer, Association of Northern California Oncologists (C) **Stock Ownership:** None **Honoraria:** None **Research Funding:** None **Expert Testimony:** None **Other Remuneration:** None

Author Contributions

Conception and design: Roberta Buell, Patricia Falconer, José Luis González

Administrative support: Roberta Buell, Patricia Falconer, José Luis González

Provision of study materials or patients: Roberta Buell, Patricia Falconer

Collection and assembly of data: Roberta Buell, Patricia Falconer

Data analysis and interpretation: Roberta Buell, Patricia Falconer

Manuscript writing: Roberta Buell, Patricia Falconer, José Luis González

Final approval of manuscript: Roberta Buell, Patricia Falconer, José Luis González

Corresponding author: José Luis González, Executive Director, Association of Northern California Oncologists, PO Box 151109, San Rafael, CA 94915-1109; e-mail: ExecDir@anco-online.org.

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Benchmarks for Value in Cancer Care: An Analysis of a Large Commercial Population

By Michael Kolodziej, MD, J. Russell Hoverman, MD, PhD, Jody S. Garey, PharmD, Janet Espirito, PharmD, Sheetal Sheth, PharmD, Aimee Ginsburg, PharmD, Marcus A. Neubauer, MD, Debra Patt, MD, MPH, Barry Brooks, MD, Charles White, MD, Mark Sitarik, MD, Roger Anderson, DrPH, and Roy Beveridge, MD

US Oncology Research, The Woodlands, TX

Abstract

Purpose: Cancer costs are increasing at an unprecedented rate. Key cost drivers include chemotherapy, hospital admissions/emergency room visits, and aggressive end-of-life care. We sought to evaluate these costs in a commercial payer population in collaboration with consultants from Milliman.

Patients and Methods: We used a retrospective analysis of Medstat 2007 to evaluate chemotherapy costs and use. Included patients had a cancer diagnosis; received chemotherapy during the evaluation period; had at least 1 day of coverage between January 1 and December 31, 2007 (medical and prescription coverage); was younger than age 70, and had active employment or was the spouse of an active employee. Costs are allowed amounts and are trended until 2009. Admission rates and emergency room visits are reported. Hospice use and

chemotherapy during the last 14 and 30 days of life were also evaluated.

Results: In this commercial population of 14 million patients, 0.68% had claims for a cancer diagnosis; approximately 22% of those received chemotherapy during the study time period. Patients with cancer receiving chemotherapy averaged \$111,000 per year in total medical and pharmacy costs. The average hospitalization rate for any reason was 1 admission/yr. Approximately 40% (or 0.4 admits/year) were identified as being chemotherapy related. Of the 3.5% of patients who died in the hospital, 51% received chemotherapy within 30 days of death.

Conclusion: Understanding the costs of cancer care offers opportunities to formulate a strategic plan to control cancer costs and maintain quality care. Comprehensive cancer solutions to address the full spectrum of care will facilitate improved quality and patient outcomes.

Introduction

Cancer care is a serious medical and financial burden for individuals, employers, and society. As a result of increasing costs of drug therapies, payers have begun shifting financial responsibility to patients in the form of copayments, coinsurance, and higher deductibles.¹ According to the Milliman Medical Index,

² employee-paid health care costs for a family of four doubled from \$3,634 in 2002 to \$8,008 in 2011. In 1965, 5% of the United States gross domestic product (GDP) was spent on health care, whereas 16% of GDP was spent in 2004, and it is projected that nearly 20% of GDP will be spent on health care in 2014.³

Cancer care represents more than 5% of current health care spending. Significant regional variation exists in use of chemotherapy for lung, breast, rectal, and ovarian cancer populations, and variations by age, race, and socioeconomic factors lead to wide differences in costs.¹⁻⁴ The Dartmouth Atlas project and others have shown significant variation in costs of treatment for certain types of cancer without a difference in the quality of care.⁵⁻⁷

Despite increasing prevalence rates and costs, contemporary costs of treating cancer are largely unknown. In 2004, physicians concerned with these trends at the Kansas City Cancer Centers decided to explicitly consider costs—in addition to efficacy and toxicity—as a criterion for optimizing chemotherapy treatment regimens.⁴ This approach was expanded and supported by the US Oncology network and became known as Level I Pathways. These pathways provide treatment guidelines for cancer diagnoses on the basis of efficacy, safety, and cost of therapy. Other commercial or clinic-based groups have published similar programs.⁷⁻⁹ An obstacle these initiatives faced was a lack of published data demonstrating the financial value of these pathways to commercial payers given that no benchmarks for comparison were available.

Because of the growing concern regarding variations in treatment and increasing costs, we collaborated with consultants from Milliman to assess the prevalence and costs associated with cancer treatment in a commercially insured population.¹⁰ Costs associated with outpatient chemotherapy, hospital admissions, emergency room (ER) visits, and end-of-life care were evaluated, and some regional variation of these parameters is presented.

Patients and Methods

Patient Identification and Characterization From a National Claims Database

Medstat 2007, which consists of annual employer and health plan data and contains medical and drug data for more than 23 million employees, their spouses, and dependents, was analyzed by using a retrospective cohort design to evaluate cancer therapy costs and use. After exclusions to create a homogenous population with commercial benefits, the database contains all covered medical claims for approximately 14 million insured lives. Inclusion criteria required patients to have at least 1 day of coverage between January 1 and December 31, 2007 (medical and prescription coverage); be younger than age 70; and be an active employee or the spouse of an active employee. Cancer diagnoses were determined by the presence of a cancer ICD-9 (International Classification of Diseases, ninth revision) code in 2007 on two or more examination and management physician claims or one or more inpatient facility or ER facility claim. Squamous cell cancer of the skin was excluded. Fourteen Level I Pathway cancer diagnoses were condensed into 10 cancer cohorts (Appendix Table A1, online only). This was done to group similar diagnoses with low prevalence rates into categories (lymphomas) and to account for those diagnoses that cannot be distinguished within claims data (lung cancer). Patients were defined as receiving chemotherapy if they had one or more claims with a chemotherapy J code (J9) or NDC (National Drug Code

Directory) code. Patients receiving only hormone therapy were not included as patients receiving chemotherapy.¹⁰

Chemotherapy-Related Inpatient Admissions and ER Visits

Admissions (chemotherapy-related admission [CRA]) and ER visits (chemotherapy-related ER visit [CRER]) were identified as chemotherapy-related if the primary ICD-9 code for the inpatient admission or ER claim was a chemotherapy-related adverse event or if a secondary ICD-9 code for the inpatient or ER claim was a chemotherapy-related adverse event and the primary ICD-9 code was a cancer diagnosis. CRER visits resulting in an admission were categorized as a CRA.¹⁰

Hospice Claims and Death in the Hospital

Hospice-related examination and management codes were used to identify those patients enrolled onto hospice care during the evaluation period. Patients who died during a hospitalization were identified by the inpatient discharge status code. All costs incurred during the last 14 or 30 days of a patient's life were tabulated.¹⁰

Costs

Costs were tabulated for each of the 10 cancer cohorts, grouped according to standard service lines, and the weighted average cost across the 10 cancer cohorts was calculated. Medical and pharmacy claims incurred from January 1 to December 31, 2007, were included.¹⁰ Costs were payer allowed amounts and, to represent more recent cost levels, were projected to 2009 using the Milliman Medical Index trend. The Milliman Medical Index tracks the cost of services paid under an employer health-benefit program including costs paid by employees such as deductibles, coinsurance, and copayments. Cost information was presented as per patient per month (PPPM). In this report, chemotherapy costs include drugs only and do not include administration costs. Additional analysis evaluated the annual drug cost trends from 2003 to 2007.

Geographic Variation

By using two-digit zip codes in MedStat 2007 data, locales with sufficient patient numbers were assessed for variations in chemotherapy costs and CRA/CRER visits.¹⁰

Results

Prevalence of Cancer

From the Medstat population of approximately 14 million commercially insured lives, 104,473 patients with cancer were identified. Cancer prevalence varied according to age and sex. Prostate, lung, and colon cancers were most prevalent in males, and breast, lung, and colon cancers were most prevalent in females.

In this Medstat population, 0.68% of patients had claims for a cancer diagnosis during the year. These patients accounted for approximately 10% of all medical costs in the population. Ap-

Figure 1. Cost of patients with cancer receiving chemotherapy versus other populations. CLL, chronic lymphocytic leukemia.

Figure 2. Total costs and chemotherapy costs for patients treated with chemotherapy. CLL, chronic lymphocytic leukemia.

proximately 22% of patients with a cancer diagnosis received chemotherapy.¹⁰

Cancer Care Costs

Patients with cancer receiving chemotherapy averaged \$111,000 per year in total medical and pharmacy costs. In contrast, the average annual per capita medical cost (including pharmacy) for nononcology patients was less than \$4,000. The per patient annual cost for patients with cancer receiving chemotherapy was, on average, approximately four times the cost of patients with cancer not receiving chemotherapy. These costs were significantly higher than the averages for commercial patients with common chronic diseases and patients without cancer. After adjusting to match the demographics of patients without cancer to those with cancer, patients with cancer receiving chemotherapy incur six times the annual cost of patients with diabetes and 26 times the cost of patients without cancer (Fig 1). The majority of costs incurred by patients with cancer receiving chemotherapy occurred in the outpatient setting. Outpatient costs

Figure 3. Chemotherapy cost of patients treated with chemotherapy. CLL, chronic lymphocytic leukemia.

included chemotherapy drugs, infusions, physician visits, lab, radiology, and ambulatory surgery. Chemotherapy drugs accounted for 25% of total costs (Fig 2).¹⁰

Level I Pathways Data

Level I Pathways—specific diagnoses, represented in 10 cancer cohorts, accounted for 65% of claims from patients with cancer; 25% of this group received chemotherapy in the year. The following data represent those patients with pathway diagnoses. Within those 10 cohorts, chemotherapy drugs for patients receiving chemotherapy averaged \$20,000 per year. On a PPPM basis, chemotherapy drug costs ranged from \$1,100 PPPM for chronic lymphocytic leukemia (CLL) to \$4,000 PPPM for patients with colon cancer receiving chemotherapy (Fig 3).¹⁰

Milliman consultants also examined the trend in chemotherapy costs for the 10 cancer cohorts from 2003 to 2007. In 2003, the average annual chemotherapy cost/person was \$12,767. This figure increased by 26% in 2004 to \$16,041 and again by varying percentages through 2007 to \$24,203. The percentage

increase from 2005 to 2006 was 18%, and from 2006 to 2007, it was 8%.

Use of Medical Services

Use of certain chemotherapy-related medical services, such as CRA and CRER visits, as well as the use of services near the end of life (including hospice or chemotherapy near death) was also investigated. The national average annual hospitalization rate for a commercially insured individual is about 0.055 per person and varies geographically. In this population of patients with cancer receiving chemotherapy, the average rate of hospitalization for any reason was one admission per year. Approximately 40% (or 0.4 admissions per year) were identified as CRA. The five most common reasons for CRA were infectious complications (32%), cytopenias (18%), GI-related symptoms (11.7%), fluid/electrolyte disorders (11.5%), and thromboembolic complications (9%). The range of inpatient admissions varied among cancers, with the lowest rate for breast cancer (0.55 admissions per year overall; 0.2 CRA) and the highest rate for lung cancer, colon cancer and CLL (1.5-2 admissions per year overall; 0.6-0.9 CRA per year). ER visits occurred more frequently in this cancer population with approximately two visits per year compared with the national average of about 0.17 per person per year. Approximately 50% of the ER visits were CRER.¹⁰

Patients receiving chemotherapy within 14 and 30 days of death, as well as those patients who died in the hospital, were evaluated. On average, 3.5% of patients with cancer receiving chemotherapy during the year died in an inpatient hospital setting. Of those patients dying in the hospital, 24% received chemotherapy within 14 days of death and 51% received chemotherapy within 30 days of death. The average total allowed costs for these patients during their last 14 and 30 days of life were \$25,960 and \$42,731, respectively. Patients with lung or pancreatic cancer were more likely to die in the hospital and receive chemotherapy near the end of life.¹⁰

Approximately 5% of patients treated with chemotherapy received hospice care during the year. Not surprisingly, the frequency of reported hospice care is generally higher for cancers with higher mortality rates and shorter survival such as lung (11%) and pancreatic cancer (18%). Hormone-refractory prostate cancer with overall survival less than 3 years also had higher hospice use (8%). The diagnoses with the lowest use of hospice includes the hematologic malignancies (lymphoma, multiple myeloma, CLL; < 2%) and breast cancer (2%).¹⁰

Geographic Variation in Cost and Use Related to Chemotherapy Cost Drivers

Twenty of a possible 100 locales defined by two-digit zip codes contained sufficient patient numbers to examine chemotherapy drug costs, CRAs, and CRER visits rates. Patients treated with chemotherapy per locale ranged from 228 to 831. Significant variations among regions were apparent, although aggregating by two-digit zip codes does not necessarily produce homogeneous groups. Whereas the national average chemotherapy drug cost per patient was \$22,353, costs ranged from \$17,212 to

\$27,494. Similarly the average rate for CRA and CRER per 1,000 patients was 378 and 929 with a range from 223 to 484 for CRA and 465 to 1,626 for CRER, respectively. This analysis did not attempt to stratify the results according to cancer diagnosis or any other specific characteristics; therefore, these results are suggestive of a savings potential in both chemotherapy and hospital use.¹⁰

Discussion

Studies of cancer treatment in the United States have identified consistent trends in cancer care. Tangka et al¹¹ reported that the prevalence of cancer has increased among all payer populations between 1987 and 2005. In addition, total medical cancer cost (expressed in 2007 dollars) nearly doubled from \$24.7 billion to \$48.1 billion during that time. Although previous studies of the impact of cancer care costs on overall health care expenditures report that cancer costs represent 5% of overall health care spending, this evaluation of Medstat shows that cancer costs represent 10% of spending for commercial payers.

Increasing cancer treatment costs has implications to society, including payers and patients. Although payers are increasing efforts to manage chemotherapy use and costs, they are shifting the cost of care to employers and, ultimately, patients. Recent reports indicate that higher costs may negatively impact patients' ability to receive recommended treatment.¹²⁻¹⁵

Our article presents costs associated with the most common nonsquamous cell skin cancer diagnoses in a commercial population in the United States.¹⁰ Previous publications report costs for the Medicare population obtained from SEER-Medicare-linked data.⁵ Commercial results are of considerable relevance for several reasons. First, the commercial population is generally younger with less comorbidity; therefore our total cost analysis may offer an estimate that is less complicated by other conditions and treatments. Second, in the commercial population, most costs are directly borne by businesses that fund health care and, by extension, the working population. Finally, we highlight chemotherapy costs, which in part include the cost of pharmaceutical innovation, a cost that, as a result of Medicare reimbursement policy, is often borne predominantly by commercial payers. This analysis does have limitations. Limited clinical information can be obtained from claims data, which means that many factors, such as cancer stage or histology among others, are not available. In addition, the regional variation analysis is limited and not normalized across diagnoses. Additional study could further define the impact of cost and resource variation on cancer care costs.

Published guidelines have established the broad range of evidence-based, clinically appropriate treatment options.^{7-9,16} However, few consider costs of therapy. When costs are considered, there is potential for significant savings. Two studies—one in non-small-cell lung cancer and one in colon cancer—suggest the use of evidence-based, cost-conscious clinical guidelines, such as Level I Pathways, can reduce variability and costs associated with chemotherapy treatment while maintaining outcomes.^{17,18}

Hospital admissions represent another area of opportunity for cost containment. Geographic variation of inpatient length of stay and hospital admission rates for patients with cancer has been well established.^{5,19} Although recent evidence suggests hospitalization rates for patients with cancer have decreased,¹¹ this analysis found that hospitalization is frequent and commonly related to chemotherapy toxicity. In one report, more than 60% of ER visits resulted in hospitalization.¹⁹ Another study found that approximately one third of hospital admissions for patients receiving chemotherapy are related to treatment and that almost half of that treatment was palliative.²⁰ The mortality rate associated with hospitalizations for treatment-related toxicity has been reported at 6%. Understanding the common reasons for admissions and development of specific patient education and toxicity management initiatives may help minimize adverse effects and reduce hospitalizations and ER visits.

End-of-life care is important from a quality and cost perspective, given that a large amount of health care spending occurs just before a patient's death. In this study, chemotherapy proximate to or during a terminal admission was not rare and was expensive. One study suggests attention to end-of-life care through counseling intervention.²¹ Another reported a more structured palliative care program administered with standard cancer care in patients with metastatic non-small-cell lung cancer resulted in improved quality of life, less aggressive care at the end of life, and longer survival compared with standard care alone.²²

Summary

Multiple cost centers contribute to the societal expense of cancer care, and we discuss three of them: chemotherapy costs, hospital- and ER-related costs, and end-of-life costs. Variation in the use of these medical services identifies potential areas of opportunities for quality and cost improvements. Identifying and categorizing the costs of cancer care allow for an analysis of opportunities and formulation of a strategic plan to control cancer costs while maintaining high-quality care. Comprehensive cancer solutions that address the full spectrum of care, including initial selection of treatment, toxicity management, and end-of-life care, will facilitate improved quality and patient outcomes. Significant points for intervention and resultant quality and cost management seem to be chemotherapy choice, toxicity management, and end-of-life care.

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Employment or Leadership Position: Michael Kolodziej, US Oncology (C); J. Russell Hoverman, US Oncology (C), Texas Oncology (C), The Joint Commission (C); Marcus A. Neubauer, US Oncology (C); Debra A. Patt, US Oncology (C); Charles White, Texas Oncology (C), US Oncology (U); Mark Sitarik, US Oncology (C); Roy A. Beveridge, US Oncology (C) **Consultant or Advisory Role:** J. Russell Hoverman, UnitedHealthcare (C), Blue Cross Association (C); Barry Brooks, Amgen (C) **Stock Ownership:** None **Honoraria:** Barry Brooks, Eisai **Research Funding:** None **Expert Testimony:** None **Other Remuneration:** None

Author Contributions

Conception and design: Michael Kolodziej, J. Russell Hoverman, Jody S. Garey, Sheetal Sheth, Aimee Ginsburg, Roger W. Anderson, Roy A. Beveridge

Administrative support: Michael Kolodziej, Jody S. Garey, Sheetal Sheth

Collection and assembly of data: Michael Kolodziej, J. Russell Hoverman, Jody S. Garey, Janet L. Espirito, Sheetal Sheth, Aimee Ginsburg, Debra A. Patt, Barry Brooks, Charles White, Roger W. Anderson, Roy A. Beveridge

Data analysis and interpretation: Michael Kolodziej, J. Russell Hoverman, Jody S. Garey, Janet L. Espirito, Sheetal Sheth, Aimee Ginsburg, Marcus A. Neubauer, Debra A. Patt, Barry Brooks, Charles White, Mark Sitarik, Roger W. Anderson, Roy A. Beveridge

Manuscript writing: Michael Kolodziej, J. Russell Hoverman, Jody S. Garey, Janet L. Espirito, Sheetal Sheth, Aimee Ginsburg, Marcus A. Neubauer, Debra A. Patt, Barry Brooks, Charles White, Roger W. Anderson, Roy A. Beveridge

Final approval of manuscript: Michael Kolodziej, J. Russell Hoverman, Jody S. Garey, Janet L. Espirito, Sheetal Sheth, Aimee Ginsburg, Marcus A. Neubauer, Debra A. Patt, Barry Brooks, Charles White, Mark Sitarik, Roger W. Anderson, Roy A. Beveridge

Corresponding author: Michael Kolodziej, MD, New York Oncology Hematology, US Oncology, 10101 Woodloch Forest, The Woodlands, TX 77380; e-mail: Michael.kolodziej@USOncology.com.

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Medicare Reimbursement Changes and the Practice of Oncology: Understanding of the Past Is a Key to the Future

By Jonas A. de Souza, MD, and Gilberto de Lima Lopes Jr, MD, MBA, FAMS

The University of Chicago Medical Center, Chicago, IL; The Johns Hopkins Singapore International Medical Centre and The Johns Hopkins University School of Medicine, Baltimore, MD

In 2010, President Obama signed into law the Patient Protection and Affordable Care Act (PPACA); it was an event of clear historic significance for health care in America. In oncology, the PPACA has the challenging goal of reconciling the needs of a growing elderly population and the barriers to access of costly yet valuable oncologic services. To successfully bridge this gap, the oncology community must reflect on the impact that prior Medicare reimbursement changes have had on the current oncology practice model and capitalize on the lessons learned in recent years.

Medical Oncology: Complexity Toward Outpatient Care

In the past three decades, medical oncology services have shifted from being primarily inpatient (often requiring prolonged hospitalizations to deliver medications) to a nearly entirely outpatient endeavor. However, the complexity of the process has increased dramatically. There has been a steady increase in the number of drugs used to treat cancer, and most of these agents are not as easily administered as other drugs that are dispensed at a physician's office. Often, these medications are toxic, come in powder or concentrated form, and need to be reconstituted under sterile and environmentally safe conditions. Many have unique considerations that must be dealt with at delivery.

As a consequence, chemotherapy orders require a multidisciplinary professional team to execute. Orders must be reviewed by a pharmacist (or nurse in smaller practices), who then prepares the pretreatment supportive medications (antiemetics, antiallergy, and other supportive treatments) and the chemotherapy itself. These chemotherapy-certified professionals es-

tablish intravenous access and administer the medications at a specified rate of infusion within a designated amount of time (which depends on chemical stability and varies for each drug, ranging from a few minutes to a few days). Additionally, patients must be taught about the adverse effects and complications of chemotherapy. Patients are monitored during therapy, and any drug reactions must be documented. This process highlights the multidisciplinary and complex nature of cancer care.

Medicare Drug Reimbursement: From 95% of Average Wholesale Price to 106% of Average Sales Price

Reimbursement for oncology services does not reflect this complexity. The Balanced Budget Act of 1997 established that the Medicare payment for drugs would be based on either the Medicare claim or 95% of the average wholesale price, whichever is lower. Although this was originally intended to reflect the average price of medications that wholesalers sold to pharmacies, physicians, and other providers, in practice it became an index of manufacturer-reported prices and did not accurately represent the price of actual sales. This method was arguably one of the primary factors in the 25% yearly increase in payments for drugs between 1998 and 2003.¹ The Medicare Prescription Drug and Modernization Act of 2003 aimed to bring drug reimbursement closer to actual purchasing prices as well as to increase payments for drug administration. It changed the method of payment to 85% of average wholesale price in 2004 and to 106% of average sales price (ASP) in 2005 and beyond. Manufacturers are required to calculate and report to the Cen-