

A Demonstration of Physician-Generated Health Care Costs in an Initial Orthopaedic Visit

Andrew Schwartz, M.D., Paul Levin, M.D., Andrew Lovy, M.D., and Jonathan Koenig, M.D.

Abstract

Background: The cost of health care in the United States continues to grow faster than any other sector of the economy. A small portion of the health care costs is attributed to physician reimbursement, but orthopaedic surgeons have an abundance of costly diagnostic and therapeutic modalities for patient care. Providers must be aware of the health care costs they generate in their practice in order to become stewards of cost control. Identifying the costs associated with an ambulatory orthopaedic practice is an important foundation in understanding and controlling the costs that the practice generates.

Questions: What is the average cost of an initial encounter with an orthopaedic surgeon? What are the most costly elements in a management plan? How can we financially optimize resource utilization?

Methods: We conducted a retrospective review of the records of 23 orthopaedic surgeons that span the main orthopaedic subspecialties at an urban academic medical center. All physician-generated orders were obtained and valuated by their cost to the institution's health care management organization.

Results: A total patient of 822 encounters were reviewed with a total cost of \$403,235 (an average of \$490 per patient).

The most prevalent order was an x-ray (68.1% of patients). The majority of the financial burden was from physical therapy prescriptions (43.1% of total costs). The most expensive diagnostic modalities were advanced imaging studies, particularly magnetic resonance imaging and computed tomography (20.8% of costs).

Conclusion: This health care burden exposé is not designed to discourage technology utilization. The authors aim to encourage stewardship through judicious use of diagnostic and therapeutic modalities. Most common musculoskeletal conditions presenting for evaluation can be appropriately diagnosed with a thorough history and physical examination followed by initial non-operative management. Diagnostic workups are only necessary during an initial visit when the initial evaluation suggests life or limb threatening conditions that need to be identified in an expeditious fashion. Diagnostic imaging may become necessary during future visits if the patient has not responded to the initial management and the patient is ready to undergo a surgical intervention based on the imaging. Obtaining imaging to identify a surgical lesion is an unnecessary expense if the patient is not ready to undergo surgery. Understanding the cost of clinical decisions can promote adherence to evidence-based diagnostic indications to more efficiently use health care funds.

Andrew Schwartz, M.D., Emory University Orthopaedic and Spine Hospital, Emory University School of Medicine, Atlanta, Georgia. Paul Levin, M.D., Department of Orthopaedic Surgery, Montefiore Medical Center and Albert Einstein College of Medicine, Bronx, New York. Andrew Lovy, M.D., Department of Orthopaedic Surgery, Icahn School of Medicine at Mount Sinai, New York, New York. Jonathan Koenig, M.D., Department of Orthopaedic Surgery, Hofstra Northwell School of Medicine at Lenox Hill Hospital, New York, New York.

Correspondence: Paul Levin, M.D., Montefiore Medical Center, Medical Arts Pavilion, 3400 Bainbridge Avenue, Bronx, New York 10467; plevin@montefiore.org.

Health care expenditures in the United States (US) grew by 3.6% to nearly \$3 trillion in 2013, or \$9,255 per person, accounting for 17.4% of Gross Domestic Product (GDP).¹ Despite expending 50% more per person than the second heaviest spender (Fig. 1), US health care still ranks well below many of these nations in terms of overall life expectancy (26th), infant mortality rate (10th), and access to care (40th).² Furthermore, 62% of bankruptcy filings are secondary to debt related to medical bills.³ The Patient Protection and Affordable Care Act (PPACA) was initiated in 2010 to combat health care

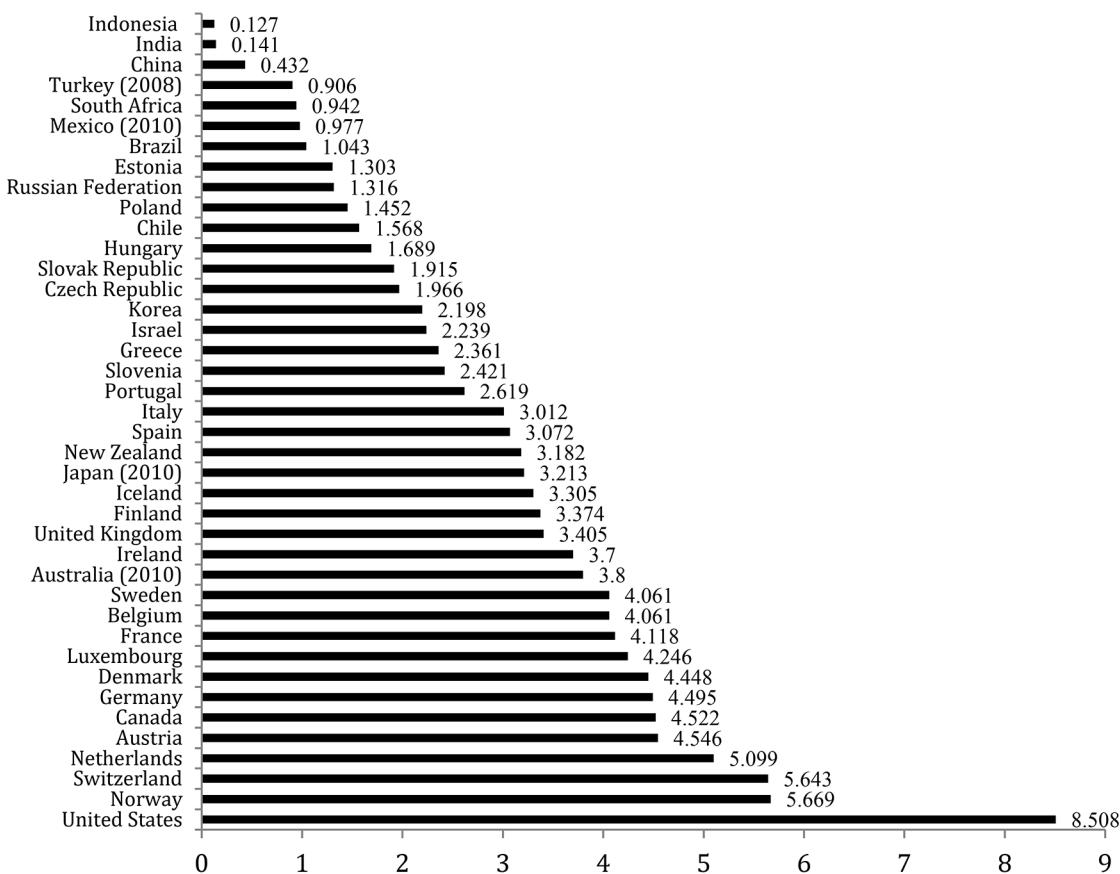


Figure 1 The most recent data (2011, unless otherwise noted) for health expenditure per capita for the top 40 countries. Standardized to purchasing power parity (PPP). Adapted from National Health Care Expenditure Data.

economy discrepancies. Despite the current dynamic state of American health care, it is predicted that 37 million Americans will still be uninsured if the PPACA is fully implemented in 2019.⁴ Presently, with new leadership in Washington, the future of the PPACA is unclear. Most plans being discussed are likely to decrease Medicaid funding for health insurance plans and are likely to leave more Americans uninsured in the future. The USA, unlike every other member state of the Organization for Economic Co-operation and Development (OECD), funds the majority of health insurance through employers and business. The burden of health insurance costs of our major industries creates the possibility that our industries are less competitive in the world market. In order to efficiently provide care despite variable state participation in the PPACA,⁴ it is in the best interest of the individual, the health care provider, and the country as a whole to provide health care with a patient-centric and judicious approach. There are many obstacles, as costly disease management modalities are still rewarded by private insurers.

Numerous sources have been cited as the cause for the escalating health care costs, including, but not limited to, the aging population, increased cost of services, administrative costs, and advancing health care technology. While

physicians' salaries constitute a very small percentage (8.6%) of health care costs, the physician's evaluation and management of patients generates a substantial percentage of the overall costs.⁵ Diagnostic workups, treatment recommendations, and medical interventions originate from the doctor-patient encounter. For example, a patient consults an orthopaedic surgeon for a chronically painful shoulder: the surgeon orders x-rays, administers a corticosteroid injection, and prescribes an NSAID and physical therapy. When the patient does not respond to initial management, an MRI is recommended, and then a patient may undergo surgical intervention with postoperative rehabilitation. While clinically appropriate in many situations, each step has an associated cost (Table 1). Ultimately, these costs will comprise a significant portion of health care expenditures.

Identifying where resources are utilized unnecessarily is an important strategy for controlling mounting costs. Quantifying the average cost of an outpatient visit in an orthopaedic surgeon's office will allow surgeons to better understand the downstream economic impact of their clinical decisions. This should not prevent ordering of appropriate interventions but will rather elucidate the cost of services and enable physicians to make a more informed cost-benefit decision. The benefit to the appropriate utiliza-

Table 1 The Cost and Frequency of Each Physician's Order to the Institution's Health Management Organization*

Physician's Order	Average Cost (% of total cost)	Total Orders (% of patients receiving order)
X-ray	\$46.22 (6.4)	560 (68.1)
MRI	\$672.32 (13.8)	87 (10.6)
CT	\$407.60 (1.1)	11 (1.3)
EMG	\$1,119.99 (3.3)	12 (1.5)
Bone Scan	\$453.40 (0.7)	6 (0.7)
Indium Scan	\$261.94 (0.1)	1 (0.1)
Physical Therapy	\$70.00 per session (30.9)	118 (14.4)
Prescription Medication	\$70.98 (1.1)	121 (14.7)
Injection	\$62.00 (5.1)	193 (23.5)
Consult	\$50.00 (0.8)	21 (2.6)
Cast or Splint	\$105.50 (1.0)	43 (5.2)
Brace or Orthotic	\$269.19 (3.2)	71 (8.6)
Aspiration	\$85.85 (0.2)	9 (1.1)
Basic Bloodwork	\$23.21 (0.1)	1 (0.1)
Office Appointment	\$158.04 (32.2)	822 (100)

*Averages were taken when some tests had slight cost variability based on body part evaluated.

tion of services to both patient care and health care costs are clear and fulfill the bioethical principle of justice by limiting waste. In addition, in an effort to save money, health care organizations and insurance companies may use appropriate resource utilization as a quality matrix in evaluating physician performance. Rueben and Cassel⁶ stratified this ethical imperative at the practicing physician level, describing three levels of stewardship in reducing health care costs: at the national level, at the payer-insurance level, and at the clinician level. While there are numerous entities targeting the national and payer levels, physicians are solely obligated to carry out the third level.

Physicians have a professional and fiduciary responsibility to care for each patient, devoid of any conflicts, and to deliver all necessary care to help their patients recover. We also have an ethical imperative to all health consumers to deploy resources, including capital, judiciously to ensure excellent care. This is referred to as the "bioethical principle of distributive justice." Failure to utilize our resources pertinently is a violation of this principle and an obvious waste of resources. As US health care expenditures continue to increase, concerns increase over the budget deficit and health care optimization since the PPACA's current status is unclear. Physicians must be cognizant of the role they play in generating these expenses. By recognizing individual costs, physicians can save health care dollars without compromising patient care by reevaluating a study or intervention's appropriate indications. The goal of this

investigation was to characterize physician generated health care expenses in an urban outpatient orthopaedic faculty practice.

Methods

We conducted a retrospective review of the records of all initial ambulatory patient evaluations by a member of the orthopaedic faculty caring for patients in an urban university practice during a 3-week period from November 29, 2011, through December 17, 2011. The study was approved by the Institutional Review Board and was HIPAA-compliant. Patient records of all 23 orthopaedic surgeons within the institution were reviewed, with a maximum of 40 patients per surgeon included in the study, to avoid any single surgeon's ordering habits from skewing the data. Conditions evaluated included a spectrum of both acute and chronic conditions. Orthopaedic subspecialties included adult reconstruction, trauma, sports medicine, spine, pediatrics, shoulder and elbow, hand, foot and ankle, and oncology.

During chart review, data was collected on all physician-generated expenses, including x-ray, computed tomography (CT), magnetic resonance imaging (MRI), electromyography (EMG), bone scan, prescribed medication, injection, aspiration, blood work, cast or splint application, braces or orthotics prescribed, physical therapy, and consultations ordered. Costs were calculated as a total of all physicians' orders during the study period rather than on a per-visit basis. Although the usual prescription for physical therapy

was for two to three sessions per week for 6 weeks, there was significant variability in the actual number of therapy sessions that each patient attended, and the precise data could not be readily identified. In determining the cost of prescribed physical therapy services, the decision was made to use 15 sessions as the average number of sessions per prescription, as all physician orders were handled as intention to treat analysis. As a separate analysis, the senior author (PEL) reviewed the necessity of any MRI's obtained for the chief complaint, but outside of the institution's orthopaedic department and prior to the pertinent orthopaedic evaluation, to establish evidence-based necessity for initial management. The determination as to the necessity of the MRI was established by the utility of the imaging to guide initial management of the patient. For example, MRI studies are frequently obtained in patients with acute lower back pain, no neurologic deficit, and no "red flags." These individuals are best treated with assurance and recommendations to remain active.

The cost of each physician-generated expense was determined using fee schedules provided by Montefiore Medical Center's institution-based care management organization (CMO*), and the CMO's generic prescription drug costs were used for prescribed medications.

Results

A total of 822 patients from 23 orthopaedic surgeons with an average of 35.7 ± 9.6 patient visits per surgeon were included in the study. X-ray was the most common order (560 total, 68.1% of patients), followed by injection (193 total, 23.5% of patients), and prescription medication (121 total, 14.7% of patients). Advance imaging (CT, MRI, bone scan, indium scan) was obtained on this first visit in 12.6% of patients (104 total). At total of 118 patients (14.4%) were referred to physical therapy with an estimated participation of 15 sessions.

Total cost to the CMO, including the office visit itself, over 3 weeks was \$403,235 with an average cost of over \$490 per patient. Excluding physical therapy packages (\$70 per session, 1,770 total prescribed, cost of \$123,900, 30.9% of cost), advanced imaging was the largest source of physician-generated expenses, with MRI totaling \$55,503 or 13.8% of total costs, and EMG totaling \$14,440 or 3.3% of costs. The next largest expense was basic imaging (x-ray) totaling \$25,880 or 9.0% of costs, followed by injections totaling \$20,431 or 7.1% of costs.

*CMO (Montefiore Care Management Organization) is a health care management company with over 15 years of experience that has been very successful in improving clinical quality, enhancing the patient experience, and reducing health care costs. The company works with thousands of providers who care for individuals covered by a variety of private sector and government-sponsored health insurance programs. CMO's involvement spans hospital care, rehabilitation, outpatient care, professional services, ancillary support, community-based programs, home care, and remote patient monitoring among others. For further information visit www.cmocares.com/body.cfm?id=19.

Of the 822 total patients, 63 (7.7%) had MRI studies conducted prior to orthopaedic evaluation. A total of 35 of 63 (55.6%) MRIs that were obtained prior to orthopaedic evaluation were determined to be beneficial in developing a care plan for treatment of the patient.

Discussion

In the USA, the growth of health care is outpacing inflation and currently represents the largest division of the GDP.¹ For many Americans with health insurance, their employer largely supports their health care expenses. These health care expenses place many American businesses at a competitive disadvantage worldwide. In addition, the rising cost of health care has left many self-employed Americans uninsured due to the high costs of individual policies. The PPACA has been beneficial to many health consumers, but the high deductibles and co-pays have left many of the working, but impoverished, persistently uninsured. Ironically, uninsured individuals often bear even greater burdens when seeking care by being charged "usual and customary" fees that are not subject to discount negotiations through insurance companies. Furthermore, the current status of the PPACA is undoubtedly tenuous and subject to change.

Although the physicians' fees comprise a very small portion of our overall health care disbursements, a physician's evaluation, treatment recommendations, and management of patients are responsible for a much larger portion of health care expenses. Appropriate management of musculoskeletal conditions often requires diagnostic imaging, physical therapy, prescription medications, consultations with other specialists, and operative interventions. Each one of these services is obtained at the recommendation of a physician and generates significant costs. In an orthopaedic practice, commonly generated fees beyond the cost of consultation include x-rays, corticosteroid and viscosupplementation injections, prescription medications, advanced imaging, physical therapy, and operative intervention. We have not identified any literature investigating physician-generated expenses throughout outpatient medicine and particular none in an orthopaedic surgery office setting.

Attempting to determine the average costs generated per new patient visit was challenging. Providers within our institution care for a large percentage of our patients. Any imaging studies performed in the emergency department or outpatient imaging centers of our institution prior to the orthopaedic surgeons visit are available on the institution's Picture Archiving and Communication System (PACS). The availability of these images fortunately precluded the necessity for duplication of services but likely underestimates the true cost of an initial encounter with an orthopaedic surgeon. In addition, while we conservatively decided to utilize the cost of generic prescription medications, this does not properly account for brand name medications ordered due to the preference of either the patient or the physician. Furthermore, we elected not to include the cost

of surgery scheduled during the new patient visit, as the majority of patients seeking orthopaedic evaluation are not scheduled until a later date, with frequent cancellations and rescheduling. Clearly, the cost of surgical intervention, even for a small percentage of patient encounters, would dramatically increase the average cost per ambulatory visit that we determined in our study. Any attempt to develop an assumption of an average cost of a surgical intervention would be impossible due to the large variety of surgical interventions possible and the fact that insurance companies have different reimbursement schedules. In addition, our goal was to specifically identify the common non-operative expenses generated in the evaluation of a new patient by an orthopaedic surgeon and adding the expenses for a subsequent surgical intervention would be misleading and undermine the intent of the research project.

We elected to utilize the reimbursement schedule of CMO to accommodate for the variability in reimbursement of insurance providers and an individual's ability to pay. This organization is responsible for contracting and managing a large number of insurance providers whose patients are cared for at Montefiore Medical Center. This includes many managed Medicaid programs and local government private insurance plans even though many insurance carriers reimburse at higher rates.

In our study, utilizing the CMO reimbursement rates generated an average cost of \$490 per evaluation of a new patient seen in the department of orthopaedic surgery. Extrapolating our 3-week study to 1 year of practice would total \$6,989,407. Our now-39-physician practice saw 47,700 new patients alone in 2014; this translated to an average of 1,223 patients per surgeon for the year and 102 new patients per month. Our data suggest that a mere 10% reduction in costs would save nearly \$4,600 in costs generated per physician per month. This is not to suggest that our physicians consistently generate unnecessary medical expenses, rather that physicians should be aware of the costs generated subsequent to their recommendations. The national impact would be substantial: the most recent data from the American Academy of Orthopaedic Surgeons (AAOS) and National Ambulatory Care Medical Survey showed that there were over 63 million visits to orthopaedic surgeons in 2010, an increase of nearly 15 million patients from 2009 (29.8%).⁷

Of all diagnostic services ordered by the orthopaedic surgeons in our study, imaging was the largest source of generated expenses. This finding is not surprising, as the use of advanced imaging techniques, such as MRI and CT, is frequently characterized as unnecessary and not contributing to patient care. Overuse of MRI in orthopaedics has even been highlighted in the popular news, citing a study by Dr. James Andrews where shoulder MRIs were ordered on healthy, asymptomatic baseball pitchers, and 90% had abnormal findings.⁸ Additionally, a prospective study of defensive medicine practices among orthopaedic

surgeons found that defensive imaging accounted for 19% of imaging orders, and 35% of all MRIs were ordered for defensive reasons.⁹ In our study, physicians had access to PACS technology, ideally reducing unnecessary imaging by diminishing fragmentation of care. Some patients with preexisting imaging studies had those studies available on our institution's PACS, and others brought images on discs, making 175 x-rays and 63 MRIs available to physicians. This would have added an additional \$31,481 to the total cost of patient care over 3 weeks, increasing the per-patient cost to nearly \$530. Of these, 63 x-rays and 35 MRIs were deemed to be clinically appropriate by the senior author (PEL) at the time imaging was performed.

While we do not recommend avoiding the use of these technologies, it is imperative that we recognize the magnitude of their effect on health care costs. As previously stated, there are numerous sources believed to be contributing to the increasing health care costs in the USA, but none have caused as sharp a rise as the use of new medical technologies. On the basis of a review of the economic literature, the Congressional Budget Office concluded that roughly half of the increase in health care spending during the past several decades was associated with expanded capabilities of medicine brought about by technological advances.¹⁰ This included medical imaging. In fact, an additional source cited advanced imaging as the fastest growing physician generated expense in Medicare.¹¹

Generalization of our findings to other geographic centers must be framed properly given the wide variation of both interstate and intra-state medical prices. For example, the average payment for an arthroscopic knee procedure in New Hampshire in 2008 was \$2,406 with a standard deviation of \$1,203 in inpatient hospital settings and \$2,120 with a standard deviation of \$1,358 in ambulatory settings.¹² Similar findings are observed on a regional level where a 2013 report identified a 437% differential in charges for an MRI of the lumbar spine in different regions of the country (\$468 versus \$2514).¹³ However, while costs will inherently vary, our findings can be externally generalized with a proportionate analysis of local costs.

In the setting of the wide variation of insurance plans with which our CMO works, their individual reimbursement rates and schedules may be part of a great range. The patient population cared for by our physicians encompasses a spectrum of socioeconomic groups, with a large percentage of patients in a lower socioeconomic group. Many patients cared for decline recommended diagnostic and therapeutic treatment because of the cost of deductibles and co-pays. Our analysis was not able to successfully identify individuals who declined treatment, and this segment of patients may have resulted in a misrepresentation of the average expenses generated. It would also be reasonable to believe that our finding of \$490 in physician generated expenses per new patient in outpatient orthopaedic practice may underrepresent the average costs generated by an

initial ambulatory orthopaedic encounter throughout the US.

As US health care expenditures continue to grow, the importance of physician awareness of costs associated with the services provided and studies ordered cannot be overstated. Physicians should never make a pure economic decision on the worth of an intervention or test in the care of a particular patient, but they need to have a complete understanding as to whether or not the diagnostic test or intervention, such as physical therapy, is appropriate in the management of their patient. While our finding that imaging costs account for the largest component of diagnostic expenses in orthopaedic evaluation of new patients may not be novel, it further underscores the need for understanding the benefits and limitations of physical therapy, judicious use of imaging modalities, and the reduction of unnecessary tests. We recommend using the findings of this study to carry out Reuben and Cassel's third level of stewardship—the clinician's role in avoiding impoverishment of the Medicare Part A trust fund before 2025.⁶ This is an appeal to the individual clinician to critically exercise evidence-based practices in risk-benefit, noninferiority, and clinical indications. This approach to orthopaedic practice should also include education of the patient to enable each to be an informed participant in this critical collaboration with the first two levels of stewardship (national and payer) to reduce unnecessary burden on the health care system.

Studies often advise orthopaedic surgeons to minimize costs to optimize revenue and make private practices and hospitals run more effectively.¹⁴ This study is the first known delineation of the financial impacts of most conceivable diagnostic and therapeutic outcomes of a patient's first visit. It should be used to comprehend the benefits of a judicious visit in the national health care scheme. These results apply concrete price tags to establish the need for practicing evidence-based medicine and to develop appropriate indications in synthesizing a patient's initial treatment plan. While our estimate of \$490 for the cost a primary orthopaedic visit is realistically conservative, our data plainly demonstrate the need for conscious awareness of the cost of the components of an orthopaedic workup and management.

Conflict of Interest Statement

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership,

honoraria, and paid expert testimony.

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