

## FAST TRACK ARTICLE

# Health and Productivity as a Business Strategy

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**Objective:** *The objective of this study is to assess the magnitude of health-related lost productivity relative to medical and pharmacy costs for four employers and assess the business implications of a “full-cost” approach to managing health.* **Methods:** *A database was developed by integrating medical and pharmacy claims data with employee self-report productivity and health information collected through the Health and Work Performance Questionnaire (HPQ). Information collected on employer business measures were combined with this database to model health-related lost productivity.* **Results:** *1) Health-related productivity costs were more than four times greater than medical and pharmacy costs. 2) The full cost of poor health is driven by different health conditions than those driving medical and pharmacy costs alone.* **Conclusions:** *This study demonstrates that Integrated Population Health & Productivity Management should be built on a foundation of Integrated Population Health & Productivity Measurement. Therefore, employers would reveal a blueprint for action for their integrated health and productivity enhancement strategies by measuring the full health and productivity costs related to the burdens of illness and health risk in their population.* (J Occup Environ Med. 2007;49:712–721)

**D**riven by the need for worker protection and the control of wage inflation in conjunction with several favorable tax rulings, employers have sponsored health benefits since the 1940s.<sup>1</sup> Between 1940 and 1950 there was an immediate rapid growth of persons in employer-sponsored health plans, from 20.6 million in 1940 to 142.3 million in 1950, which was over 90% of the population at that time.<sup>1</sup> Even though the percentage of covered workers has dropped to near 60% of the population in the intervening half century, the costs of health care for employers has continued to rise. The cost to provide employer-based health care benefits has risen at an ever accelerating rate to such high levels that they threaten the competitiveness of American business in the global economy. Because of this, employers are becoming more and more concerned about the full cost impact of poor health.

Through the early 1990s, multiple cost control strategies were implemented that temporarily slowed the growth of health care costs for employers, but beginning in the late 1990s, employers realized a need to look for other solutions because of a return to double-digit medical inflation. While utilization management and network management were the major foci of these early efforts, the recent interest of employers has moved to addressing the burden of illness and health risk in their workforce and its impact on their bottom line. Efforts to quantify the impact of non-occupational illnesses and injuries have led to an increased awareness of the problem, as well as to a growing awareness of the opportunities and value to the employer of

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improving employee health status.<sup>2</sup> This identification of opportunities and value by employers has led to an increasing effort into managing the health of employees as human capital with the same level of focus and interest as they give to managing their financial capital.

Along with this interest in managing health as a means to manage long-term costs, trying to manage within the separate “silos” of employer health cost categories is being identified as a flawed strategy that is, at best, missing an opportunity and, at worst, a contributor to the problem. The “silo” approach rarely brings together all the relevant pieces to create a full understanding of the magnitude and relevance of health to business results and creates a barrier to understanding the full impact of interventions. Companies historically have not examined the lost productivity implications of worker ill-health when determining benefit packages.

The short-sighted approach of managing a single health cost category can lead to benefit changes that can have the unintended consequences of increasing presenteeism or absenteeism costs while reducing direct medical or pharmacy costs, or both. It is important for employers to take a comprehensive approach to worker health protection and disease prevention. While some near-term financial benefits to employers may be realized by managing the direct medical and pharmacy costs, there is an increased recognition of the limitations of not addressing the broader health-related productivity impacts of poor health. Companies operating in challenging and competitive economic environments are turning their attention toward understanding the total impact of health and wellness on their bottom line and looking for the business case to take to their leadership teams.

CFOs (chief financial officers) are increasingly becoming attuned to the broader impact of ill health in their companies. A 2002 survey of 269

CFOs by the Integrated Benefits Institute (IBI) shows that more than 6 in 10 believe there is a strong link between the health of the workforce, its productivity, and bottom-line company impacts.<sup>3</sup> A follow-up survey of 343 CFOs demonstrates that a large majority believe that ill health not only impacts medical costs but also impacts the lost productivity associated with presenteeism and absence.<sup>4</sup>

The health costs traditionally known as the “indirect costs” of health-related productivity loss are now measurable, quantifiable, and found to be much more “direct” in their cost structure than previously considered.<sup>5-7</sup> An increasing number of employers have quantified the cost contribution of absenteeism and presenteeism in considering their broader cost of poor health. Some of this research has been performed by individual employers.<sup>8-10</sup> However, there also have been studies looking across several employers to determine the broader health care cost components, by aggregating medical, pharmacy, disability, and workers’ compensation claim costs.<sup>11</sup>

The IBI studied 2002 benefits data for group health, workers’ compensation, short- and long-term disability, incidental absence, and Family and Medical leave for 88 employers with 3.3 million covered lives. Lost productivity associated with absence accounted for nearly half of full costs.<sup>12</sup> Other studies that measured all health-related lost productivity (presenteeism and absenteeism) show that employers, on average, have \$3 of health-related productivity costs for every \$1 of medical or pharmacy claims costs.<sup>6,7,13</sup> This growing body of research demonstrates that the business value of good health is worth significantly more than previously anticipated. In fact, there is a compelling case to be made that good health is good business.

With this understanding of the total cost of poor health, employers have been looking for effective strat-

egies to manage the burden of illness and the burden of health risk in their workforces. Employers have demonstrated both medical/pharmacy and productivity cost savings through the initiation of worksite health enhancement strategies.<sup>14</sup> Through case studies, the research becomes practical and relatable to a larger group of employers. In 2006, USAA, a Texas-headquartered Employer, demonstrated an estimated three year savings of \$105 million from decreased absenteeism due to their initiatives.<sup>15</sup> In the 2005 C. Everett Koop Award application, Union Pacific Railroad demonstrated a medical/pharmacy cost savings of \$53.6 million as a result of the integration of their health activities into their business structure.<sup>16</sup> Goetzel et al. have also benchmarked promising practices in employer health and productivity management.<sup>17</sup> In addition, Michael Levitt, the Secretary of Health and Human Services, is promoting value-based benefit design and transparency on cost and quality to model where the financial incentives in the benefits are aligned to improve health status and health outcomes.<sup>18</sup>

Despite the business opportunity and the availability of business solutions, there has not yet been universal movement to an integrated and comprehensive approach to managing total health care costs and better management of the burden of disease and risk. There is certainly interest on the part of business leadership as demonstrated by the Partnership for Prevention and by the IBI. These efforts to manage the human capital is in complete alignment with longstanding efforts to maximize the value of the human resource through efforts such as training, management development, and enabling human performance through technology. Now that there are proven health enhancement initiatives, such as wellness, disease management, medication management, disability management and case management, that are available to employers, a signifi-

icant barrier to action has been removed. Even so, some employers still hold off on taking action based on such key questions as, “What is right for my organization?” and “How will I know it is getting the desired results in my organization after implementing the strategy?” The ability of employers to evaluate both the full opportunity as well as understand specific areas to target remains a challenge for employers where contribution to business outcome is important. One of the more significant challenges for most employers is to obtain a validated report on workforce productivity. Due to variances in work rules, leave policies, and shortcomings of absence management systems, many employers are unable to track total absence. Even fewer companies are able to track their presenteeism across their entire workforce.

Therefore the American College of Occupational and Environmental Medicine (ACOEM) and IBI have initiated research to assess the full impact of health conditions on medical/pharmacy cost as well as the health-related productivity costs of absenteeism and presenteeism. ACOEM and IBI, working in strategic collaboration with Matria Health care and Harvard Medical School focused this “Health and Productivity as a Business Strategy” study on identifying leading chronic conditions that drive health-related costs. So far, the research identified the total cost impact of health on the financial bottom line for four employers with a total of 57,000 employees.

Validation studies that have been completed on the Health and Work Performance Questionnaire (HPQ) have demonstrated it to measure productivity consistently within an employed population.<sup>19,20</sup> In addition, data on medical and pharmacy claims were integrated with employee self-reported information from the HPQ to enable calculation of health care expenditures and provide additional financial factors for calculating operations expenses. This

study also pilot tested a survey to collect benefit program information from each employer to allow an analysis of the health cost findings in the context of the business practices of the organizations.

The results of this study provide insights into the health conditions that have the greatest impact on the broader cost of poor health for the employers included in this study. Through a more complete understanding of the full cost of poor health by combining direct costs and productivity costs, there is significant opportunity to design health enhancement and absence management strategies that will provide optimal business outcomes. In addition, this study demonstrates that the siloed approach of looking at only portions of the health-related costs, such as medical/pharmacy costs only, is a flawed strategy. Understanding the full cost of poor health is necessary when prioritizing and planning an organization’s health enhancement initiatives. The contention that “good health is a good business” has been a rallying cry for those that have been enlightening corporate America to the business value of health and why there is a strong business case for employers to invest in better health for their employees. This study provides a framework for the demonstration of that concept and makes a case for the need for organizational specific measurement.

## Materials and Methods

This article documents results from the first four companies participating in the Health and Productivity as a Business Strategy study that will ultimately involve ten employers. These companies were identified based on size, availability of medical and pharmacy claims data, availability of HPQ survey results or a willingness to survey their workforce, and their agreement to allow the merging of these data sources. This research was naturalistic such that the methods were adapted to accommodate each company’s unique char-

acteristics. It also was retrospective, as we conducted the HPQ survey of the companies and merged the findings with medical and pharmacy claims incurred during the 12 months prior to the survey. In addition, we pilot tested a business metrics survey to determine how benefit plan variations might impact productivity.

## HPQ

The HPQ is one of the most widely used validated self-report instruments to measure the productivity impact of health conditions through the measurement of absence and presenteeism.<sup>20</sup> It was developed by Dr Ronald Kessler and the World Health Organization as part of the Global Burden of Disease Initiative.<sup>21</sup>

The HPQ measures both absenteeism and presenteeism time loss components of productivity lost due to the 27 health conditions listed in Table 1.<sup>20</sup> Absenteeism is the amount of time the employee is away from the workplace. Rather than counting the number of days off, the HPQ focuses on hours missed both on sick days and workdays. It also asks about extra hours of work. The result is a sum of total hours missed. Presenteeism is the on-the-job time lost due to the health conditions. Presenteeism is measured through self report as the hours of productive work time lost. Time-loss results are converted into days by dividing the sum of hours by 8 and reported by health condition relative to other workers without those health conditions. The results are adjusted in this way to take into account the “baseline” of absenteeism and presenteeism in the workforce. Thus, the lost time for employees with chronic conditions is above and beyond the time loss for employees without these conditions. However, lost time must be monetized so that it can accurately represent the financial lost productivity suffered by the organization and, thus, be made meaningful to senior financial executives. In this opportunity-cost framework,

**TABLE 1**

## Health Conditions

|                              |                         |
|------------------------------|-------------------------|
| Allergy                      | Headache                |
| Anxiety                      | High cholesterol        |
| Arthritis                    | Hypertension            |
| Asthma                       | Irritable bowel         |
| Back/neck pain               | Migraine                |
| Bladder/urinary              | Obesity                 |
| Chronic bronchitis/emphysema | Osteoporosis            |
| Congestive heart failure     | Other cancer            |
| COPD                         | Other chronic pain      |
| Coronary heart disease       | Other emotional problem |
| Depression                   | Skin cancer             |
| Diabetes                     | Sleeping problem        |
| Fatigue                      | Ulcer                   |
| GERD                         |                         |

COPD indicates chronic obstructive pulmonary disease; GERD, gastroesophageal reflux disease.

the total lost productivity is derived by multiplying the total lost work-days<sup>20</sup> for each condition by the number of employees in the sample, the average salary per day (or actual salary if available), a fringe benefits adjustment, and an industry-specific worker absence multiplier.<sup>22</sup>

### Medical Claims

We analyzed paid medical claims incurred during the 12 months prior to the HPQ survey implementation. We matched the medical claims to the HPQ results by mapping the claims' primary ICD9 (International Classification of Diseases, 9th Revision) diagnoses to the HPQ medical conditions. We first applied the identification algorithms developed by Matria Healthcare to map most of the chronic health conditions. Because the HPQ includes only chronic conditions, we recognize that there are many expensive health conditions that are not currently measured by the HPQ and others that are vague and difficult to determine a match. For example, "abdominal pain" could be attributed to indigestion, bladder, gynecological, or many other sources and "general symptoms" could be any or no condition. The costs associated with non-HPQ conditions and vague diagnoses were grouped into the "other" category.

This study used primary, secondary, and tertiary diagnoses codes

from the International Classification of Diseases, Version 9, Clinical Modification (ICD-9-CM), to determine medical prevalence. However, only the primary diagnosis code was used to allocate cost, which is defined as the amount the employer paid on that claim. While the paid amount is influenced by other factors such as benefit plan design elements, such as network discounts, employee deductibles, coinsurance, and copays, the paid claim represents the employers' cost burden.

### Pharmacy Claims

We also analyzed paid pharmacy claims incurred during the 12 months prior to the HPQ survey date. To map pharmacy claims to HPQ health conditions, we first applied an algorithm developed for a Medicaid Rx model by Gilmer et al., which mapped a majority of medications used to treat chronic illness.<sup>23</sup> We then identified those unmapped drugs and manually mapped an additional 300 National Drug Codes (NDCs) that had relatively high costs. For medications that could be used for more than one condition, costs were allocated to the conditions based on the medical claim prevalence of the condition. For example, bronchodilators can be used to treat both asthma and COPD (chronic obstructive pulmonary disease), and we

found that the medical prevalence of asthma was 4.7% and the medical prevalence of COPD was 1.4%. So, we used the prevalence to calculate the ratio of asthma to COPD and allocated 76.9% of bronchodilator costs to asthma and 23.1% to COPD.

### Business Metrics Survey

In an effort to better understand the variation of business practices associated with health and productivity, we administered a survey to each employer participant. The survey questions and scoring algorithm were developed through expert opinion and are face valid. The experts included individuals with employer experience and individuals with expertise in developing survey instruments. The Business Metric Survey assessed five major areas: 1) Health Management, which included disease management, health risk assessment use, and use of lifestyle management/health coaching programs; 2) Disability Management, which includes case management in short-term disability benefits and return-to-work policies; 3) Case Management with workers' compensation policies and practices; 4) Consumer-Directed Health initiatives; and 5) Business Performance Metrics.

The responses were scored according to a weighted scoring method. Disability management and health management were weighted more highly than workers' compensation was. The Consumer-Directed initiatives, while measured, were not included in the scoring. This approach was chosen because the experts agreed that not enough experience to establish best practices for consumer-directed health initiatives was yet available. The Business Performance Measures were collected to support the analysis and were not used in the scoring. We will present results of the instrument in a subsequent publication.

**TABLE 2**

Number of Employees, Number of HPQ Respondents, Response Rate, and Medical and Pharmacy Claim Volume for Each Company

|            | No. of Employees | No. of HPQ Respondents | Response Rate | No. of Medical Claims for HPQ Respondents | No. of Drug Claims for HPQ Respondents |
|------------|------------------|------------------------|---------------|---|--|
| Company A  | 12,000           | 2005                   | 16.7%         | 43,692                                    | 28,119                                 |
| Company B* | 1407             | 1407                   | 100%          | 30,783                                    | 11,269                                 |
| Company C  | 6000             | 2072                   | 34.6%         | 44,255                                    | 15,544                                 |
| Company D  | 38,413           | 9896                   | 25.8%         | 211,969                                   | 66,885                                 |
| Total      | 57,666           | 15,380                 | 26.7%         | 330,699                                   | 121,817                                |

\*Company B was modeled for its entire workforce.

## Results

### Company Details

Each of the four companies in this study posed a unique data collection challenge. We adapted the methods to accommodate these real-world situations. For each company, Table 2 shows the number of employees, HPQ respondents, response rate, and their volume of medical and pharmacy claims.

Company A is an industrial chemical manufacturer. In October 2005, Datastat, a subcontracted survey research firm, administered the HPQ instrument to the workforce of approximately 12,000 employees. Even though all data were de-identified, this company required individual consent to include employee's data in the analysis; 4576 (38.1%) employees completed the HPQ. However, since only 2005 (16.7%) provided permission for the researchers to match their HPQ results to their medical and pharmacy claim records, the analysis was restricted to these employees.

Company B is a computer hardware manufacturer. In May and June of 2006, Company B conducted a campaign to administer the HPQ instrument to the workforce of approximately 1407 employees; only 265 (18.8%) of Company B employees responded to the survey. Due to the combination of a small sample size, the condition prevalence distribution, and Health Insurance Portability and Accountability Act (HIPPA) regulations that restrict data cell size reporting to at least 30 per cell, our

ability to report these HPQ results was limited. In order to include HPQ survey results in the analysis of Company B's employees medical and pharmacy claims data, researchers at Harvard University created a weighted sample that mirrored the demographics and disorder prevalence profiles of Company B's employees. This sample was created from a large data set ( $n = 38,447$ ) of combined responses to the HPQ survey by employees of several large companies. The medical and pharmacy claims data were analyzed for all eligible employees from June 2005 to June 2006.

Company C is a multi-site telecommunications and technology company. In June and July of 2005, Company C administered a health risk assessment (HRA) instrument that included the HPQ to its workforce of approximately 6000 employees. Of those, 2165 (36%) employees responded to the survey and gave permission for us to match their HPQ results to their medical and pharmacy claim records. The HRA/HPQ instrument collected productivity data on 15 of the 27 HPQ conditions. Also, there were some minor limitations on the detailed data analysis, due to the combination of HIPPA regulations that restrict data cell size reporting to at least 30 per cell and the condition prevalence distribution.

Company D is a telecommunication and information technology company with over 38,000 employees. They conducted an HPQ survey in November and December 2005 and 9896 (25.8%) employees re-

sponded with valid HPQ data. The data collection for Company D did not require special adjustments. However, as will be seen later, this company had significant amounts of overtime, which may have skewed the results.

Table 2 shows each company's number of employees, number of HPQ respondents, response rate, and medical and pharmacy claim volume.

### Combined Results

Data from the four companies are combined for an analysis of 57,666 employees, of which 15,380 provided valid responses to the HPQ survey, a 26.7% response rate. Table 3 presents the top ten health conditions when viewed from various data sources: medical only, pharmacy only, combined medical and pharmacy, productivity only, and the total cost that combines medical, pharmacy, and productivity. Different patterns are seen depending on the data source used.

### The Traditional View

Based on medical and drug claims costs alone, the top ten conditions are cancer (other than skin cancer), back/neck pain, coronary heart disease, other chronic pain, high cholesterol, gastroesophageal reflux disease (GERD), diabetes, sleeping problems, hypertension, and arthritis (see Fig. 1).

### The Full-Cost View

A more complete picture of the cost impact of health conditions emerge when medical, pharmacy,

**TABLE 3**  
Top Ten HPQ Health Conditions Viewed from Multiple Perspectives

|    | Medical                | Pharmacy               | Medical and Pharmacy   | Productivity       | Total Cost         |
|----|------------------------|------------------------|------------------------|--------------------|--------------------|
| 1  | Other cancer           | High cholesterol       | Other cancer           | Fatigue            | Back/neck pain     |
| 2  | Back/neck pain         | GERD                   | Back/neck pain         | Depression         | Depression         |
| 3  | Other chronic pain     | Arthritis              | Coronary heart disease | Back/neck pain     | Fatigue            |
| 4  | Coronary heart disease | Diabetes               | Other chronic pain     | Sleeping problem   | Other chronic pain |
| 5  | Sleeping problem       | Depression             | High cholesterol       | Other chronic pain | Sleeping problem   |
| 6  | High cholesterol       | Hypertension           | GERD                   | Arthritis          | High cholesterol   |
| 7  | Hypertension           | Asthma                 | Diabetes               | Hypertension       | Arthritis          |
| 8  | Diabetes               | Allergy                | Sleeping problem       | Obesity            | Hypertension       |
| 9  | Headache               | Anxiety                | Hypertension           | High cholesterol   | Obesity            |
| 10 | Depression             | Coronary heart disease | Arthritis              | Anxiety            | Anxiety            |

GERD indicates gastroesophageal reflux disease.

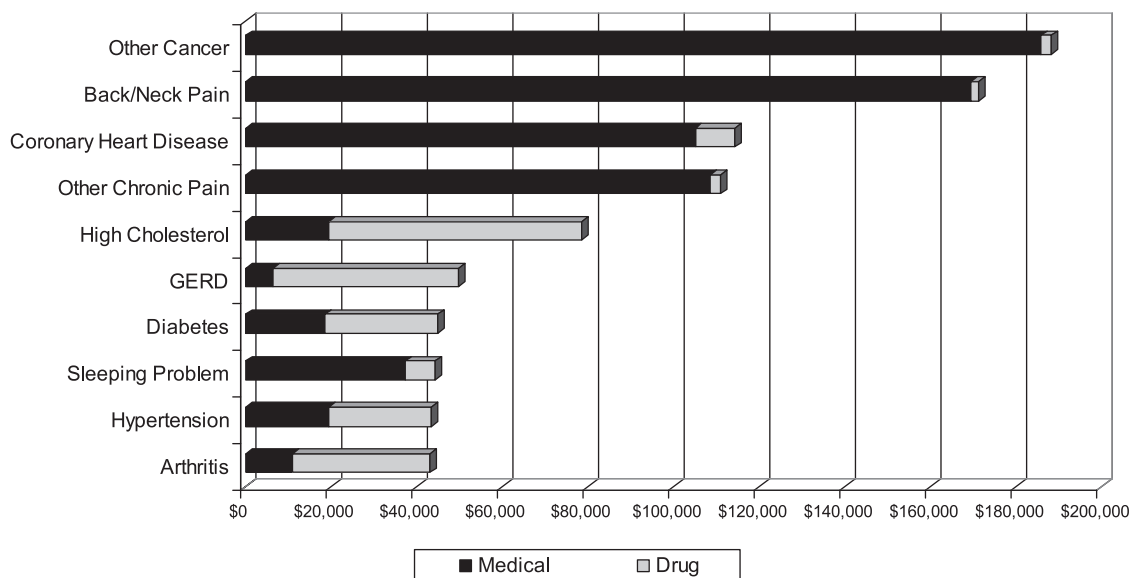


Fig. 1. Top 10 medical conditions by annual medical and drug cost per 1000 FTEs for all companies.

and productivity costs are combined (see Fig. 2). Here, we find the top ten are back/neck pain, depression, fatigue, chronic pain, sleeping problems, high cholesterol, arthritis, hypertension, obesity, and anxiety as having the largest share of these broader medical/pharmacy and productivity costs. One can also observe the relative proportion of costs associated with medical, pharmacy, and productivity and find that productivity costs are about four times that of the former.

**Discussion**

Linking the productivity costs associated with absenteeism and presenteeism with medical/pharmacy claims costs and health-related business information reveals a

compelling approach for employers to evaluate the broader cost impact of health conditions in a workforce. Since our intent was to review the cost experience of each employer individually as well as collectively, across several medical conditions, it gave us insight into some of the variation that is seen between employers in the broader costs of poor health. This study looks at multiple employers using actual productivity loss survey data and at the same time demonstrates an approach that can be replicated for other employers who would desire to evaluate the same broad health-related cost drivers as part of an integrated health management strategy. There are several key findings from this initial research

effort on four employers. This is the first phase of a continuing research study that will ultimately include ten employers allowing a more in-depth comparative analysis of how health related business practices and benefit structures impact total health-related costs.

First, health-related lost productivity is large relative to expenditures for medical care and pharmacy benefits. Understanding the link between health conditions and productivity loss as well as medical/pharmacy costs is critical if employers are to successfully manage the business impacts of poor health. Other research has demonstrated that reductions of risks and improvements in health status, can lead to improve-

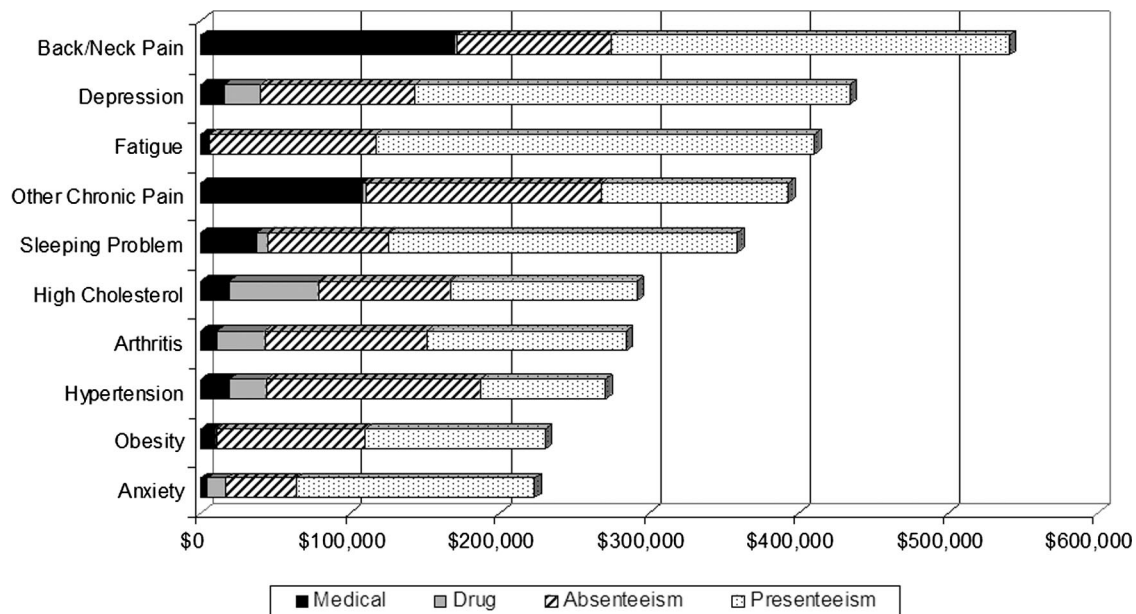


Fig. 2. Top 10 medical conditions by annual medical, drug, and productivity cost per 1000 FTEs for all companies.

ments in productivity.<sup>24</sup> Certainly the opportunity to improve absenteeism and presenteeism costs is significant for all conditions listed because the measured value of these costs exceeds the medical/pharmacy costs (Fig. 2). Similar to other studies,<sup>8,9,20</sup> this study demonstrates that limiting the measurement of health costs to medical/pharmacy costs misses a significant portion of the savings opportunity and therefore significantly underestimates articulation of the business case for investing in health enhancement strategies.

The second finding is that integrated health and productivity management initiatives will need an integrated health and productivity measurement strategy. The health conditions that drive the broader health-related productivity and medical/pharmacy costs, as listed in Table 3, are substantially different from the health conditions that impact medical/pharmacy costs alone. Depression, fatigue, anxiety, and allergy are not included in the top ten costs for the medical and pharmacy cost category. At the same time GERD, diabetes, coronary heart disease, and cancer are identified in the top ten of the medical and pharmacy

costs and not identified in the top ten of the broader cost of health. The implication is that a business strategy to manage health costs that only focuses on medical/pharmacy costs of care may miss many significant opportunities to positively impact the bottom line.

These findings should be considered when approaching decisions on managing health with health enhancement interventions. When implementing a strategy to manage an organization's human capital costs, it is necessary to understand not only the full cost of poor health but also the cost contribution of each category within the total cost (medical, pharmacy, presenteeism, and absenteeism costs). Table 3 shows the relative ranking of health conditions as determined by the categories of the cost contributions of the condition. Therefore, prioritizing health conditions to be managed and targeting interventions to be delivered can be considered in the context of the integrated cost categories to be controlled.

If employers were to evaluate the medical and pharmacy costs, the relative contributions of conditions would rank as follows: cancer (other

than skin cancer), back/neck pain, coronary heart disease, other chronic pain, high cholesterol, GERD, diabetes, sleeping problems, hypertension, and arthritis. Traditional disease management initiatives with an emphasis on the common chronic conditions like cardiovascular disease, diabetes, and back/neck pain would certainly be justified by this perspective of highest claims costs alone. However, if an employer examined the broader costs (including medical, pharmacy, absenteeism, and presenteeism costs) the relative rankings are back/neck pain, depression, fatigue, other chronic pain, sleeping problem, high cholesterol, arthritis, hypertension, obesity, and anxiety. These broader health-related cost rankings that include productivity loss would indicate these additional health conditions should be considered in population health management initiatives as well. Through an understanding of the impact of productivity costs, the employer may choose to refocus their resources to achieve even larger cost savings in cost categories that may have gone unrecognized. Therefore, value based benefit design should take into account both the medical/pharmacy health costs and the pro-

ductivity costs from these health conditions in health enhancement, absence-management, and cost-containment strategies to decrease the burden of illness and the burden of health risk.

There is variation in productivity costs by condition as well, as demonstrated in Fig. 2. Health conditions that have the highest absenteeism/presenteeism costs are different from those that lead to the highest medical and pharmacy costs. For example, depression has relatively low direct medical and pharmacy costs. This may relate to payment system issues that could be contributing to this low cost including benefit structure or primary care provider inexperience about diagnosing depression, as well as there are no significant procedures attached to this diagnosis in the vast majority of cases. On the other hand, in this study, depression was shown to be a condition that has a high self-reported prevalence rate (28.8%) and leads to very significant health related productivity loss, nearly ten times the medical and pharmacy costs of care.

Further research is needed to determine whether investment in higher quality diagnoses and treatment would lead to a reduction in productivity losses that exceeded the potential increase in medical/pharmacy costs from these quality of care improvement interventions. Sequential use of validated productivity surveys (like the HPQ) to monitor changes in presenteeism and absenteeism costs pre- and post-intervention, should be documented along with other determinants in evaluating the broader value proposition of investing in health enhancement and evidence-based medicine initiatives.

Another research finding is that the ten most expensive conditions based on productivity and medical/pharmacy costs were also the most significant contributors to the overall total annual medical and pharmacy claims costs for these employers. In fact, 60% of the total annual medical/pharmacy claims costs for all condi-

tions measured in the study are related to these top ten conditions. If the focus of health enhancement activities is not related to these conditions then significant opportunity is being lost. Likewise if the health enhancement activities for the top ten broader cost conditions do not consider interventions that address impact on productivity, the results will be significantly less than the opportunity presented.

These early findings suggest that the ranking of highest-cost conditions varies somewhat by employer. This suggests the need for measuring medical, pharmacy, and productivity costs for employers as a more routine practice. Generalizations from this small sample, while giving some broad sense of an opportunity for improvement, are not sufficient to focus interventions within a population health-enhancement strategy for any individual employer a priori. Each organization has unique characteristics and, as shown by these results, requires individual analysis to determine its specific blueprint for action in managing its broader health-related costs. This method of collection of broader cost information offers a practical solution for developing an action plan to implement a population health- and productivity-enhancement strategy.

### Limitations

This initial phase of this study had a number of limitations, most of which will be addressed in the second phase of the study that is now underway. First, as noted earlier in this paper, each of the first four companies presented had unique data collection issues that required adjustments to the methodology. While this initial stage of the research demonstrates the robustness of the HPQ instrument, continuing phases of this research will consider more closely how these variations may affect the validity of the findings. Second, the HPQ survey was offered to each company's population and employees self-selected into the study. At

this point in the analysis, we do not know the magnitude or impact of potential selection bias. We plan to conduct a more detailed sample analysis in the next phase of the study. Third, the mapping of pharmacy claims to HPQ conditions did not include all National Drug Code (NDC) codes and therefore may have underestimated the pharmacy costs for some conditions. Also, the allocation of costs for medications used for multiple conditions followed the overall medical prevalence of conditions. It is possible that some of the pharmacy costs are misallocated among conditions. Furthermore, the dollars reported should not be used as point estimates, but rather they are markers to observe the relative magnitude of the health conditions and the relative contribution of each cost component. In addition, the costs associated with medical/pharmacy claims and lost productivity are only representative of the four companies in this initial phase of the study.

Another challenge in this study was measuring productivity in the fully operational setting of several employers. Each of the four companies had a unique situation for which we had to account. For example, Company A had half of the respondents withhold permission to integrate their medical, pharmacy, and self-reported HPQ survey data. Company A also had to integrate the HPQ data collection into a limited time window that was scheduled around other employee survey initiatives. The small sample size for Company B, combined with HIPAA restrictions, required the researcher to model the results. This strategy allowed the production of a valid company report, but may cause challenges as we dissect the combined results. Company C completed an HPQ that did not include the health conditions of fatigue and sleeping problems, thus underreporting the productivity impact of those conditions. Finally, Company D's employees worked a significant amount of

overtime, which conversely impacted the absenteeism numbers.

Furthermore, the total cost of health may be underestimated because this study did not factor in the costs of disability or workers' compensation costs. It also did not assess the impact of critical incidents as have some of the other Health Work Performance Studies.<sup>19</sup>

Finally, there is no assurance that all the costs quantified for these companies can easily be converted to the corporate bottom line through health interventions. The change in currently measured expenses for the organization depends on the mechanism by which these expenses are funded and tracked within an organization. For example, medical/pharmacy expenses in a fully insured group health plan will not immediately return to the employer, but rather to the insurer. Likewise, changes in absence and presenteeism might not result in immediate reductions in wage costs or revenue increases. Health improvements resulting in impacts on medical, pharmacy, and lost productivity must be evaluated against the operational funding approaches to translate these results into actual business results that are meaningful to the C-Suite. Future investigation will help identify those translation tools to be used to create the business metrics.

Regardless of these limitations, this study demonstrated an effective method to use the HPQ mapped to pharmacy and medical claims to measure the prevalence and total cost of a health condition to the organization. There may be operational challenges and limitations that can interfere with the use of this method, but the commitment to find solutions to the challenges allowed the four employers included in this study to have meaningful and useable data.

However, after phase 2 of this study is completed with a full complement of ten employers, most of these limitations will have been addressed and there will likely be even

more relevant findings for employers in general.

## Conclusions

As employers begin to manage the health of their employees, there is need to evaluate the broader cost of poor health and to identify opportunities for improvement. The often used practices of managing health care costs by focusing on a narrow view of claims costs have not been successful at curtailing broader cost increases long term. The magnitude of health-related lost productivity relative to medical and pharmacy costs for these four employers and the business implications of a "full-cost" approach to managing health care, are shown through the findings. Therefore, it is important for employers to assess the broader health related costs in their company and take a comprehensive, integrated approach to worker health enhancement and disease management and prevention. As employers move to the next generation of integrated health enhancement strategies, integrated cost information will be necessary. In addition, there is a great need to assure that there are not unintended broader health-related productivity cost consequences of newly developing value-based benefit designs and consumer-driven health approaches. This will only be accomplished by measuring and monitoring the broader cost of poor health and conversely, the broader business value of good health.

This research demonstrates the importance of measuring and merging both productivity and medical and pharmacy claims data to determine this broader cost of health conditions. Whether it is in the design of benefits, the implementation of a wellness program, absence management, or in the implementation of health enhancement strategies, the ability to prioritize and target interventions to lead to the maximum business efficiency will require methods of collecting and using these broader costs of health data. The use of the HPQ to

collect absenteeism and presenteeism data and the claims mapping to the conditions offers a practical tool that allows the broader cost of poor health to be measured. Individual employers are then able to develop business strategies that are targeted at their business needs.

More research is needed to determine if the variation in costs that are identified in these four employers can be related to some health-related characteristics of the business. The addition of other employers in phase 2 of this study will be useful in determining a correlation between business practices and health and productivity outcomes.

When significant opportunities exist through improvements in productivity that can lead to financial performance improvement for an organization, the business will require a mechanism to evaluate and track those productivity changes. Measuring the cost of care delivery and then linking that to improvement in business-related outcomes, such as productivity, the business ends up with a broader value proposition, which can demonstrate a balanced scorecard of health.

Companies operating in challenging and competitive economic environments are turning their attention to understanding the total impact of health and wellness on their bottom line and looking for the solid business case that would enable them to justify an investment in health improvement. It is clear that data driven, integrated, and comprehensive health-enhancement solutions are needed for organizations to optimally manage their human capital and health-related productivity. Innovative health care strategies, ideas, tools, programs, and partnerships are now beginning to demonstrate measurable results. Employers of all sizes are discovering a competitive edge through understanding the broader health and productivity costs of their enterprise and investing in the health of their workforce.

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## References

- Blumenthal D. Employer-sponsored insurance—riding the health care tiger. *NEJM*. 2006;355:195–202.
- Altman SH, Tompkins CP, Eilat E, Glavin MPV. Escalating health care spending: is it desirable or inevitable? *Health Affairs*. 2003;W:3-1–3-14.
- Parry T, Molmen W. *On the Brink of Change: How CFOs View Investments in Health and Productivity*. Integrated Benefits Institute, San Francisco, California; 2002.
- Parry T, Jinnett. *The Business Value of Health: Linking CFOs to Health and Productivity*. Integrated Benefits Institute, San Francisco, California; 2006.
- Brady W, Bass J, Moser R, Anstadt G, Loeppke R, Leopold R. Total corporate health costs. *J Occup Environ Med*. 1997; 39:224–231.
- Loeppke R, Hymel P. Good health is good business. *J Occup Environ Med*. 2006;48:533–537.
- Loeppke RR, Hymel PA, Lofland JH, et al. Health-related workplace productivity measurement: general and migraine-specific recommendations from the ACOEM expert panel. *J Occup Environ Med*. 2003;45:349–359.
- Burton WN, Chen CY, Schultz AB, Conti DJ, Pransky G, Edington DW. Worker productivity loss associated with arthritis. *Dis Manag*. 2006;9:131–143.
- Burton WN, Pransky G, Conti DJ, Chen CY, Edington DW. The association of medical conditions and presenteeism. *J Occup Environ Med*. 2004;46:S38–S45.
- Lerner D, Allaire SH, Reisine ST. Work disability resulting from chronic health conditions. *J Occup Environ Med*. 2005; 47:253–264.
- Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *J Occup Environ Med*. 2004;46:398–412.
- Parry T, Schweitzer W. *The Business Case for Managing Health and Productivity: Results from IBI's Full-Cost Benchmarking Program*. Integrated Benefits Institute, San Francisco, California; 2004.
- Edington DW, Burton WN. Health and productivity. In McCunney RJ, editor. *A Practical Approach to Occupational and Environmental Medicine*. 3rd edition. Philadelphia, PA: Lippincott, Williams and Wilkins; 2003: 40–152.
- Aldana S. Financial impact of health promotion programs: a comprehensive review of the literature. *Am J Health Promo*. 2001;15:296–320.
- The Health Project. 2006 C. Everett Koop National Award Winner. The USAA Take Care of Your Health Program. Available at: <http://healthproject.stanford.edu/koop/2006winnerindex.htm>.
- The Health Project. 2006 C Everett Koop National Award Winner, Union Pacific Project Healthtrack 2005. Available at: <http://healthproject.stanford.edu/koop/2005winnerindex.htm>
- Goetzel RZ, Shechter D, Ozminkowski RJ, Marmet PF, Tabrizi MJ, Roemer EC. Promising practices in employer health and productivity management efforts: findings from a benchmarking study. *J Occup Environ Med*. 2007;49:111–130.
- Michael Leavitt, Health and Human Services, Four Cornerstones Initiative. 2006. Available at: <http://www.hhs.gov/transparency/index.html>
- Kessler RC, Barber C, Beck A, et al. The World Health Organization Health and Work Performance Questionnaire (HPQ). *J Occup Environ Med*. 2003;45:156–174.
- Kessler RC, Ames M, Hymel PA, et al. Using the World Health Organization Health and Work Performance Questionnaire (HPQ) to evaluate the indirect workplace costs of illness. *J Occup Environ Med*. 2004;6:S23–S37.
- Murray CJL, Lopez AD. Evidence-based health policy—lessons from the Global Burden of Disease Study. *Science*. 1996; 274:740–743.
- Nicholson S, Pauly MV, Polsky D, Sharda C, Szrek H, Berger ML. Measuring the effects of work loss on productivity with team production. *Health Econ*. 2006;15:111–123.
- Gilmer T, Kronick R, Fishman P, Ganiats TG. The Medicaid Rx Model – pharmacy-based risk adjustment for public programs. *Medical Care*. 2001;39:1188–1202.
- Burton W, Chen CY, Conti DJ, Schultz AB, Edington DW. The association between health risk change and presenteeism change. *J Occup Environ Med*. 2006; 48:252–263.