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This white paper briefly discusses the impact of illness on employee productivity and why employers are increasingly investing in health and productivity management. Further, it will describe the value of a health and productivity focus for the life sciences industry. The paper highlights the Truven Health MarketScan® Health and Productivity Management Database as a substantial data resource for conducting studies on the direct and indirect cost of illness and disease by describing key data elements and showcasing examples of published studies based on these data.

The Rise in Concern for Improving Employee Health and Productivity
In the United States in 2013, 48 percent of the population was covered by employer-sponsored health insurance.¹ In 2014, healthcare benefits contributed 10 percent of total civilian employment compensation costs.² The continually rising cost of employer-sponsored health insurance is a perennial concern and cause for government policies and private-sector initiatives aimed at cost management. While health insurance clearly covers direct healthcare costs related to the treatment of illness and disease, the indirect costs of poor health are also of increasing concern to employers. Since the 1980s, a growing segment of employers has taken a more balanced view of providing employee health-related benefits. These employers believe that spending on employee health and wellness is an investment in human capital and this investment will help their organizations manage both the direct and indirect costs of illness and disease. Employers refer to this investment as health and productivity management (HPM).

Poor health can affect employee productivity in two general ways:³
- An employee’s health status impairs on-the-job performance (presenteeism), resulting in reduced work output
- Illness or injury directly prevents an employee from working (absenteeism)
Presenteeism is the term used to describe when an employee is present on the job, but not able to work at full capacity due to health issues, such as sickness, injury, or burnout. Presenteeism is often measured through employee questionnaires and, until recently, has not been widely assessed. Presenteeism measures are increasingly being incorporated into health risk assessment (HRA) tools that employers offer as part of employee wellness initiatives.

Employers routinely measure absenteeism, the most obvious form of productivity loss, because it involves explicit monetary costs. The cost of absenteeism is captured by four types of employee benefits: paid absence, short-term disability insurance, long-term disability insurance, and workers’ compensation insurance.

For more than two decades, thought leaders have articulated the costs associated with lost productivity and the benefits of reducing both presenteeism and absenteeism through health and productivity improvement initiatives representing both business and public health perspectives. Many industrial safety and employee wellness programs resulted from these early calls to action.

The American College of Occupational and Environmental Medicine, the major academic medical body focused on occupational health, stated, “Potential benefits from employer-purchased healthcare interventions such as disease management, disability management, optimal pharmaceutical utilization, and health promotion programs include reduced medical costs and decreased productivity losses associated with the firm’s workforce.”

Similarly, the Integrated Benefits Institute, a business-focused research and education organization, emphasizes the need to take a holistic view of how employee benefit programs (health insurance, workers’ compensation, disability insurance, and paid absence) affect bottom line corporate performance, not just as cost centers, but also insofar as these programs affect work performance and employee retention.

A benchmarking survey of 43 employers conducted by Ron Z. Goetzel, PhD, and other Truven Health researchers, found that core HPM-related costs in 1998 were $9,992 per employee. These costs were comprised of:

- 47 percent group health benefits
- 37 percent employee turnover
- 8 percent unscheduled absence
- 5 percent non-occupational disability
- 3 percent workers’ compensation

The study’s authors — assuming that the 25th percentile of total costs represented an achievable, best-practice level — projected attainable cost reductions of 26 percent or a savings of $2,562 per employee. While some of these potential savings might be attributable to cost-shifting from employer to employee, there are many research studies that support the premise that spending on improving health yields measurable benefits. Goetzel reviewed the current state of knowledge regarding HPM costs and benefits in a white paper prepared for the Institute of Medicine. The review found that published estimates of returns on corporate health and wellness programs ranged from $1.40 to $13 per dollar spent, with an average of $3.48 found in one review of 32 published program evaluations.
The Value of a Health and Productivity Focus for the Pharmaceutical Industry

With the increased attention paid to the costs of new pharmaceuticals and medical technology, there has been corresponding interest in the contributions to health and productivity management. A review of published studies found substantial evidence supporting productivity benefits for drug treatment for diabetes and several other chronic diseases, including depression, asthma, allergy, and migraine. As an example, Pitney Bowes, in the face of growing costs for diabetes care due to poor compliance with prescribed treatment plans, modified its drug benefit plan to reduce patient cost-sharing for diabetes medications by providing Tier 1 coverage — the highest level of reimbursement — for these medications. The expectation was that this change would lead to improved compliance. The result was an increase in pharmacy expenditures, but a lower rate of growth for overall health expenditures relative to a benchmark trend of comparable employers. Evaluation of the Pitney Bowes experience was limited to the impact on direct healthcare expenditures.

The traditional view of medical technology as a cost driver has led to cost-management strategies, such as tiered formularies, that emphasize cost-sharing with a predictable effect of reducing demand. A study in the New England Journal of Medicine noted that one unintended consequence of tiered formularies is that some patients may discontinue prescribed therapy altogether with further consequences to quality of care. The Pitney Bowes decision to reduce rather than increase patient cost sharing for chronic medications in an effort to improve health outcomes is a diametrically opposite approach.

The movement of employers toward recognizing the value of interventions to improve health and productivity, rather than just paying for the cost of healthcare, has an impact on healthcare purchasing decisions. This is known as “value-based purchasing.” A prominent example is pay-for-performance (P4P) programs that are transforming reimbursement for physicians and hospital services. Perhaps less recognized is the impact of value-based purchasing on new medical technology, such as pharmaceutical and biotechnology products.

Medical technology and pharmaceutical suppliers are well-advised to identify and highlight the potential value of their products in terms of improving health and productivity. There is increasing interest in evidence-based value propositions among all healthcare stakeholders, and in some cases financial incentives are aligning toward effective health and productivity management.

- Employers may benefit directly from productivity gains and improved management of benefits costs
- Managed care organizations are responding to the demands of their employer customers
- Providers are measured, and sometimes paid, on objective clinical performance measures, which can be improved with appropriate use of new treatments
The Need for Health and Productivity Data
In a national survey of corporate medical directors and benefits managers:\textsuperscript{\ref{footnote}}
\begin{itemize}
  \item 86 percent expressed the belief that employee health is key to company performance
  \item 76 percent said they needed better evidence of improved productivity to make the business case for HPM programs
  \item 60 percent said their companies needed better data on productivity
\end{itemize}

The following section describes the MarketScan Health and Productivity Management Database, a rich source of productivity data for investigating the health and productivity impact of medical technologies.

The Truven Health MarketScan Health and Productivity Management Database
The MarketScan Health and Productivity Management Database provides the opportunity to combine data on workplace absence, short- and long-term disability, and workers’ compensation with medical/surgical claims and outpatient drug data. Data are available from 1997 through 2012. The database allows researchers to assess both the direct and indirect costs associated with a particular condition or treatment.

Using this dataset, researchers can:
\begin{itemize}
  \item Assess the direct and indirect costs associated with a clinical condition
  \item Measure the impact of diseases on absenteeism, short-term disability, and workers’ compensation
  \item Track total healthcare costs across both medical and workers’ compensation systems
  \item Estimate the potential return on investments in wellness or disease management programs
  \item Assess the impact of a child’s or spouse’s illness on employee absence
  \item Determine the relative costs of alternative pharmaceutical and medical device interventions, considering both group medical costs and absenteeism costs
  \item Develop predictive models that help define relationships between demographic factors and HPM outcomes
\end{itemize}
Data Elements
Sample data elements for the Health and Productivity Management Database are presented in Table 1.

| Table 1: Sample Data Elements for the Health and Productivity Management Database |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Demographic Information | Short- and Long-Term Disability | Workers’ Compensation | Incidental Absence (i.e., paid time off) | Health Plan Features | Financial Information | Inpatient and Outpatient Medical Information | Drug Information |
| Patient ID | Case days | Body part injured | Date and hours of absence | Coordination of benefits amount | Total payments | Admission date and type | Generic product ID |
| Age | Disability type | Case diagnosis | Absence type (sick, disability, vacation, etc.) | Deductible amount | Patient out-of-pocket payments | Principal diagnosis code (i.e., reason for visit) | Average wholesale price |
| Employment status and classification (hourly, etc.) | Case diagnosis | Indemnity payments | Plan type | Copayment amount | Payments to physicians | Discharge status | Prescription drug payment |
| Relationship of patient to beneficiary | Total payments | Case days | | | | | Therapeutic class |
| Geographic location (state, 3-digit ZIP code) | Cause of injury | Medical payments | | | | | Days supplied |
| Industry | | | | | | | National drug code |

Paid Absence
As a common employee benefit, paid absence provides income replacement for work lost due to ill health. In firms with at least 100 employees, 69 percent of employees had paid sick leave and 50 percent had paid personal leave during 2006. In addition, 10 percent had paid family leave, which is often used to care for ill family members. The MarketScan Health and Productivity Management Database captures episodes of paid leave as documented in the payroll systems of a subset of the employers who contribute data to the database.
Paid absence in the Health and Productivity Management Database consists of two types of records:

1. Payroll periods during which some of the employee's salary was charged to absence
2. Work days on which the employee was absent for part or all of the day

Both records include the number of hours absent and the type of absence (sick leave, disability, vacation, etc.). If there were more than one type of absence during that day or payroll period, separate records are included accordingly.

**Short- and Long-Term Disability**

In the event an employee exhausts the paid absence benefit and continues to be unable to work, many employers provide short- and long-term disability insurance (sometimes called sickness and disability insurance). Disability insurance provides a specified fraction of the employee's salary (often in the range of 60 to 80 percent) for the time they miss from work. This benefit is considered short-term because coverage is limited and often designed to fill the gap before the employee would become eligible for long-term disability insurance (typically 180 days). The Health and Productivity Management Database captures disability claims that were approved and paid to employees of companies contributing to the database.

The database contains one record for each payment made for an approved disability claim. Each claim documents a payment made to the disabled employee covering a specified period during which absence from work was due to disability. Since a given case of disability may generate more than one claim, a case identifier links together all claims related to a single case and a set of case-level variables is replicated on each associated claim. These include an ICD-9-CM diagnosis code indicating the primary reason for the case of disability, the status of the claim (closed or ongoing), the date the episode of disability began, and the date the employee returned to work, if applicable.

**Workers' Compensation**

In most states, employers are required by law to provide workers' compensation insurance for their employees to cover them for both income losses and medical expenses due to an occupational illness and injury. While many occupational hazards are inherent in the nature of the industry in question, employee health status may also contribute to losses covered under workers' compensation. For example, an employee's physical fitness may affect the risk of incurring certain injuries such as lower back and other musculoskeletal disorders. An employee's overall health status may affect alertness on the job, which, in turn, may influence the risk of an on-the-job injury. Hence, injuries covered under workers' compensation may be important targets for health and productivity improvement programs.

The Health and Productivity Management Database contains one record for payment for medical expenses and/or lost income. As with short-term disability, a workers' compensation case may generate more than one payment. The database links together all payments related to a single case. Workers' compensation data includes an ICD-9-CM diagnosis code and/or a text field indicating the nature of the injury, the date the injury occurred, and the dates of administrative activity on the case (beginning and end).
Linking HPM Data to Claims Data
Absence, short-term disability, and workers’ compensation data become extremely valuable when these data are linked to the concurrent healthcare claims histories of employees whose productivity is being measured, as well as to any family members (spouses and children) covered under their medical and prescription drug policies. These linked data allow researchers to evaluate both the direct and indirect costs of illness and disease. Patient-level claims data are derived from the Truven Health MarketScan Commercial Database of which the HPM population is a subset. Sample data elements from the claims portion of the Health and Productivity Management Database are provided in Table 1.

MarketScan Data in Action: Highlights of Studies
Truven Health Analytics™ researchers have a long track record of conducting health and productivity studies for employers and other healthcare stakeholders. The following studies were conducted using the MarketScan Health and Productivity Management Database. They illustrate a few of the potential research applications of this unique data resource.

Impact of Rheumatoid Arthritis on Direct and Indirect Healthcare Costs
Ron J. Ozminkowski, PhD, and colleagues, conducted a study to understand the impact of rheumatoid arthritis (RA) on medical expenditures, absenteeism, and short-term disability benefit costs. Employees with rheumatoid arthritis were selected from the Health and Productivity Management Database based on an ICD-9-CM diagnosis code recorded on a medical claim during the period from July 1, 1997, to December 31, 2001. The sample was limited to employees with a 12-month period of continuous eligibility for medical, absence, and disability benefits who were not pregnant during that interval. A pool of employees without RA was randomly selected and a propensity score analysis generated matched cohorts of RA patients and controls (N=8,502 in each group). Direct and indirect healthcare costs (expenditures) were compared between these groups. Figure 1 shows this comparison.

Figure 1: Direct and Indirect Costs for Rheumatoid Arthritis Patients Versus Controls

<table>
<thead>
<tr>
<th>Annual Healthcare Expenditures</th>
<th>Rheumatoid Arthritis</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical</td>
<td>$2,593</td>
<td>$3,285</td>
</tr>
<tr>
<td>Productivity</td>
<td>$6,979</td>
<td>$1,860</td>
</tr>
</tbody>
</table>
Employees with RA incurred annual expenditures that were higher than the control group by $4,427, including $3,694 more for lost productivity and $733 more for medical expenditures. This study illustrates that an analysis based on medical expenditures alone underestimates the cost of RA to the employer by a substantial amount of indirect cost.\textsuperscript{16}

**Comparison of Fibromyalgia to Rheumatoid Arthritis**

A collaboration of researchers from Truven Health and Pfizer produced a study of the direct and indirect costs of fibromyalgia (FM), using rheumatoid arthritis (RA) as a benchmark for comparison. FM was found to impose an overall burden comparable to RA, and among workers eligible for short-term disability benefits, a higher percentage of FM patients received such benefits (20 percent versus 15 percent).\textsuperscript{17}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{Figure_2.png}
\caption{Medical and Productivity Costs for Fibromyalgia Compared to Rheumatoid Arthritis}
\end{figure}

**Impact of Medication Adherence on Absenteeism and Short-Term Disability**

Dr. Ginger Carls led a study of the impact of medication adherence as observed in pharmacy claims on the number and cost of work days lost due to paid time off or short-term disability. Five therapeutic areas were selected for analysis: hyperlipidemia, hypertension, congestive heart failure, diabetes, and asthma. Adherent employees with diabetes, hypertension, dyslipidemia, and asthma/COPD realized between 1.7 and 7.1 fewer days absent from work and between 1.1 and 5.0 fewer days on short-term disability. Absenteeism and short-term disability days for adherent employees with congestive heart failure were not significantly different from non-adherent employees with that condition (shown in Figures 3 and 4).\textsuperscript{18}
Figure 3. Regression Adjusted Difference in Absent Days Between Adherent and Non-Adherent Patients

Figure shows results from the Base Model (open marker, estimate on the left for each condition pair) and the 2SRI instrumental variables model (solid marker, estimate on the right side for each pair)

Data Source: 2005-2008 MarketScan Database

Figure 4. Regression Adjusted Difference in Short-Term Disability Days Between Adherent and Non-Adherent Patients

Figure shows results from the Base Model (open marker, estimate on the left for each condition pair) and Instrumental Variables model (solid marker, estimate on the right for each pair)

Data Source: 2005-2008 MarketScan Database
Work Loss Due to Community Acquired Pneumonia

Dr. Machaon Bonafede and colleagues conducted a study of the incidence and costs of community acquired pneumonia (CAP) in a working age population. The average cost of days lost from work due to CAP was $2,391. The national burden of CAP was estimated to be $10 billion, of which 20 percent is productivity loss and 80 percent medical spending.\textsuperscript{19}

Impact of Adding a New Lipid-Lowering Drug to a Formulary

Dr. Xue Song and colleagues developed an economic model to assess the impact of adding a new cholesterol-reducing drug to the formularies of employer-sponsored health benefit plans. The model had three major modules:

1. A biometric module that estimated the number of employees at high risk for cardiovascular disease within a workforce of user-defined size and demographic composition
2. An intervention module that projected how many high-risk employees would receive cholesterol-reducing drugs, what mix of drugs they would receive, and how much the drugs would reduce risk
3. A cost-of-disease module that estimated the overall incidence and costs of cardiovascular disease and the savings that would result from a more effective intervention

Data for the third module were obtained from the Health and Productivity Management Database.

Normative data were developed on the costs of acute cardiovascular events including acute myocardial infarction (AMI), stroke, and coronary revascularization procedures (bypass surgery and angioplasty). These cost estimates included the initial hospital stay, ongoing cardiovascular care over the following 6 months, and the total duration and cost of absence from work following the hospital admission. Lost productivity accounted for 20 to 24 percent of the costs of coronary artery disease (CAD) and 43 percent of the costs of stroke, as shown in Figure 5. Focusing solely on the direct medical costs of these diseases would have substantially understated the benefits to employers of adding a more effective cholesterol treatment to their formulary.\textsuperscript{20}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure5.png}
\caption{Figure 5: Direct and Indirect Costs of Acute Cardiovascular Events}
\end{figure}
Selected Published Studies Using MarketScan Health and Productivity Data
Since 2000, more than 60 peer-reviewed publications and conference presentations have resulted from studies conducted by Truven Health researchers specializing in these areas of research: health and productivity, presenteeism, and return-on-investment for corporate health improvement programs. Below is an abbreviated listing of published studies using the MarketScan Health and Productivity Management Database.


**Summary**

Health and productivity data provide additional richness of healthcare information compared to claims data alone, allowing life sciences researchers to conduct studies that resonate as valuable to employer and health plan stakeholders. By answering important questions about how health and healthcare affect worker productivity, the MarketScan Health and Productivity Management Database becomes an important research asset in light of the central role of employers in paying for healthcare for a large group of Americans.

The Health and Productivity Management Database has the same high quality of documentation and technical support characteristic of all of the MarketScan Research Databases, enabling new users to quickly climb the learning curve. The Health and Productivity Management Database is fully HIPAA-compliant.

**Using the MarketScan Research Databases**

The family of MarketScan Research Databases, including the MarketScan Health and Productivity Management Database, offers a powerful resource for conducting healthcare research. The databases have several distinctive features:

- Fully integrated, patient-level data are pooled from diverse points of care, reflecting the true continuum and cost of healthcare (including indirect costs)
- The longitudinal tracking of patient data from all sources of care is the strongest in the industry
- Used as the basis for more than 500 studies published in peer-reviewed journal articles during the past five years places the MarketScan Research Databases among the most published in the United States
References


ABOUT TRUVEN HEALTH ANALYTICS

At Truven Health Analytics, we’re dedicated to delivering the answers our clients need to improve healthcare quality and access, and reduce costs. Our unmatched data assets, technology, analytic expertise, and comprehensive perspective have served the healthcare industry for more than 30 years. Everyday our insights and solutions give hospitals and clinicians, employers and health plans, state and federal government, life and health scientists, and policymakers the confidence they need to make the right decisions.

Truven Health Analytics owns some of the most trusted brands in healthcare, such as Micromedex, ActionOI, 100 Top Hospitals, MarketScan, and Advantage Suite. Truven Health has its principal offices in Ann Arbor, Mich.; Chicago; and Denver. For more information, please visit truvenhealth.com.

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FOR MORE INFORMATION

For more information about the MarketScan Research Databases, including the Health and Productivity Management Database, send an email to lifesciences@truvenhealth.com. Customized datasets and licensing agreements are available to suit specific data needs.