Diabetes – How employers can defuse a looming time bomb in their workforce

November 2011

Summary: U.S. employers have a lot to lose in productivity if diabetes rates do not improve. Treatment could help limit the toll of the disease, but many employees with diabetes may be unaware of their condition. Employers could benefit by improving diabetes awareness, encouraging healthy lifestyles, and facilitating disease management.

Introduction

In recognition of American Diabetes Month, we focus IBI's November Quick Study on the rising prevalence and impact of Type 2 diabetes in the U.S. The implications for employers should not be overlooked: In 2007, the American Diabetes Association estimated that disability, work loss and premature death accounted for one-third of the economic loss associated with diabetes - $58 billion, compared to $116 billion in medical costs.

Diabetes is associated with long-term complications that affect almost every part of the body. Diabetes sufferers may experience chronic problems with their eyes, unhealed wounds or foot problems before seeking any type of clinical treatment. Unfortunately, diabetes can often seem harmless since it may reveal itself only in lab results long before patients experience any symptoms or after they have had a stroke, heart attack or other serious cardiovascular event. By the time a person knows they have diabetes, the damage to their body may have been done.

In this analysis, we expand on existing work about the economic implications of diabetes to focus on its productivity impact in the workforce, in terms of both illness absences and job performance. Our results show that employees with diabetes are more likely to miss work and report lower job performance than individuals without diabetes. We also describe how employers can implement programs to support moderate improvements in blood glucose that could result in better productivity-related outcomes.

The looming time bomb

The Center for Disease Control (CDC) estimates that about 26 million people in the U.S. have diabetes. About 7 million of these individuals are undiagnosed. Perhaps more frightening for employers, in 2010 about 2 million new cases of diabetes were diagnosed in people aged 18 years or older (see chart

---


2 The American Diabetes Association used national survey data (from CDC, DHHS and others), claims databases, and a proprietary database that contains medical claims to develop these 2007 estimates. Additional detail on the specific datasets used can be found in the full report located here [http://care.diabetesjournals.org/content/31/3/596.full](http://care.diabetesjournals.org/content/31/3/596.full)

below). If current trends continue, one in three adult Americans will have diabetes by 2050.\(^4\) Risk factors for Type 2 diabetes include aging, obesity, family history, having diabetes while pregnant, a sedentary lifestyle and race/ethnicity.

For this analysis, we explore the extent of diabetes in the workforce, work-outcome implications for employers and opportunities for intervention. We address several questions:

- What is the profile of diabetic employees?
- What are the productivity implications of diabetes?
- What can employers do to help workers manage their diabetes?

IBI’s analysis draws on information on health risks, biometrics and self-reported absence and job performance via a health-risk assessment (HRA) with HPQ-Select items embedded.\(^5\) The dataset contains 99,558 responses across 55 employers with an average 1,810 employee responses per employer. Data were collected in 2009.

The HRA provided the primary source of information on self-reported chronic conditions\(^6\) socio-demographics and work-related outcome variables. In addition, the HRA dataset included biometric

\(^4\) Detailed projections and information on the causes and consequences of an increase in diabetes prevalence are available here [http://www.cdc.gov/media/pressrel/2010/r101022.html](http://www.cdc.gov/media/pressrel/2010/r101022.html).

\(^5\) These data were supplied by a disease management company working with multiple employers that use the HPQ-Select items as part of their HRA. The HPQ-Select was co-developed by IBI and Dr. Ronald Kessler of Harvard Medical School as an employer-targeted, employee self-reported lost-time instrument. It is based on the Health and Work Performance Questionnaire (HPQ) that Dr. Kessler developed with the World Health Organization.

\(^6\) The following self-reported chronic conditions were also included in the analysis: arthritis, chronic pain, osteoporosis, migraine, hypertension, chronic heart failure, heart disease, high cholesterol, ulcer, gastroesophageal reflux disease (GERD), allergies, asthma, chronic obstructive pulmonary disease, urinary problems, obesity (when BMI categories are not used), sleeping problems, fatigue, cancer, depression and anxiety.
information that allowed IBI to compare self-reported diabetes to lab values that indicate probable diabetes.  

**Diabetes in the workforce**

Three-quarters of the 45,232 employees in our sample have blood glucose in the normal range. About 5% of the sample has blood glucose levels that indicated a likelihood of diabetes. Another 22% have blood glucose levels indicating prediabetes, or an elevated risk for developing diabetes in the future.

What is the profile of diabetic employees?

Typically, blood glucose levels indicating diabetes were observed among older workers, males, ethnic/racial minorities, and employees in clerical, service, crafts, technical support and laborer occupations (compared to employees in executive and professional occupations). Since the models control for chronic health conditions, ethnic and occupational variables (which could be proxies for educational attainment and earnings) could account for either disparities in access to or quality of health care or the cumulative effects of employees’ lifetime socioeconomic circumstances. Employers may

---

7 For the most part, we obtain our results by estimating multivariate regression models controlling for age, sex, occupation, body mass (described below), and the presence of 20 other chronic health conditions. We limit our analysis to 45,235 employees who have valid scores on the fasting plasma (or blood) glucose test (FPG), one of the most common tests for diabetes. Recent research has shown the utility of using FPG to predict probable Type 2 Diabetes [http://care.diabetesjournals.org/content/32/4/644.full](http://care.diabetesjournals.org/content/32/4/644.full). Results for the A1c hemoglobin test were also included in the HRA, but only for a much smaller subsample of employees with FPG results. For this reason, we do not analyze A1c here.

8 FPG test values were used to determine probable diabetes as follows: normal (between 70 and 100 mg of glucose per deciliter), prediabetes (between 100 and 125 mg/dl) and diabetes (126 mg/dl and above). FPG levels less than 70 mg/dl indicate hypoglycemia, a low blood sugar condition that can arise from complications with the treatment for diabetes (see National Institutes of Health, [National Diabetes Information Clearinghouse](https://www.niddk.nih.gov/health-information/diabetescombatting-diabetes/high-blood-sugar-hypoglycemia)). Because this complicates interpretation of the results, we exclude these employees (about 3% of the original sample of employees with FPG values). We also exclude about 1% of the remaining employees because they had FPG values at least 3 standard deviations from the mean. In practice, the maximum value for employees in the diabetes group is 257.
benefit from ensuring that their health plans and wellness outreach efforts focus diabetes information and management resources on these high risk groups.

Diabetes tends to be co-morbid with several other serious medical conditions. All else equal, the likelihood of diabetes generally increases with body mass, and is highest for employees with the following self-reported chronic health conditions:

- Hypertension
- Heart disease
- High cholesterol
- GERD
- Sleeping disorders
- Anxiety

**What are the productivity implications of diabetes?**

In addition to increasing the risk of permanently-disabling or life-threatening conditions such as glaucoma, stroke, or heart disease, people with diabetes often suffer from acute symptoms such as fatigue, irritability, and infections (particularly on the feet, which can limit mobility for short durations, and which could later necessitate amputation). This could lead to missed work time due to illness and degraded performance while on the job.

**People with diabetes are more likely to miss work because of illness.** Our results corroborate the link between diabetes and job productivity. Overall, about 13% of all employees missed at least one day of work over the previous 28 days. For diabetic employees, the percentage was 18%. On average, the odds of missing at least one day of work in the last month were 47% higher for workers with diabetes than for workers with normal fasting blood glucose. By contrast, the odds for a worker with pre-diabetes were only 16% higher than the odds for a worker with normal blood glucose. The finding that diabetic employees miss more work than employees with prediabetes warrants further research into whether moderate improvements in blood glucose can result in better productivity outcomes for employers.

**People with diabetes report lower job performance.** Additionally, diabetic employees report slightly lower job performance than employees with normal blood glucose levels, even after adjusting for other health conditions. Performance for employees with prediabetes levels of blood glucose is not discernibly different than that for employees with normal blood glucose – underscoring again the potential for positive outcomes by achieving moderate blood glucose improvements.

**Defusing the Time Bomb – What can employers do to help workers manage their diabetes?**

The CDC offers practical guidance to individuals with diabetes and to employers, health plans and others with an interest in supporting the continued health of employees with diabetes. Employers can influence both the prevention of Type 2 diabetes and help control the effects of diabetes for their employees who are already diagnosed.

**Increase awareness.** The first thing employers can do is improve employees’ access to blood glucose testing – paying special attention to those groups identified as having a high likelihood of elevated blood

---

9 We measure body mass using the common “body mass index” (BMI). BMI is calculated as the quotient of a person’s weight in kg over their height in m².

glucose levels. Since knowledge of diabetes requires diagnosis by a provider based on lab results, relying on self-reports of diabetes to determine prevalence in a workforce will most likely only identify individuals with diabetes who have already been diagnosed. Individuals with prediabetes will most likely not be identified through a self-reported survey unless biometric information is also obtained.

Access to testing is especially important given that 55% of the 2,118 employees with glucose levels above 125 mg responded “no” when asked directly if they had diabetes. While this lack of diabetes awareness is troubling, the positive news is that almost all (95%) of the employees who were aware of their diabetes reported that they were currently receiving diabetes treatments from a medical professional.

It is likely that broader contact with the healthcare system – including treatment for other chronic illnesses – improves awareness of diabetes. Our results show that among employees with blood glucose levels in the diabetes range, on average, the more conditions for which a person was being treated (other than diabetes itself), the more likely they were to self-report having diabetes. Specifically, given the baseline level of diabetes awareness (45%), we estimate that about 75% of diabetic employees treated for obesity were aware of their diabetes. Diabetes awareness was also relatively high among employees currently treated for high cholesterol, high blood pressure, and depression. Diabetes awareness was particularly low (22%) among employees currently being treated for migraines and other severe headaches.

### Estimated awareness of diabetes

<table>
<thead>
<tr>
<th>Condition</th>
<th>Awareness (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>75</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>70</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>67</td>
</tr>
<tr>
<td>Depression</td>
<td>61</td>
</tr>
<tr>
<td>Migraine/headaches</td>
<td>22</td>
</tr>
</tbody>
</table>

Promote weight loss among employees with unhealthy body mass. The second thing employers can do is provide greater support for employees who wish to adopt healthier lifestyles. Given the known association between diabetes and unhealthy body weight, this is particularly true for employees who are trying to lose weight or maintain a healthy body weight.

About 38% of the employees studied maintained a healthy BMI (between 19 and 25 kg/m2), and about 36% were overweight (BMI between 25 and 30). The majority of the obese employees (and about 15% of all employees) were at class I obesity level (BMI between 30 and 35), and 4% of the sample was in the most extreme BMI class III (BMI >40), sometimes referred to as “morbid obesity.” Only 1% of employees were underweight.
Excluding those employees currently in treatment for diabetes (which could account for lower blood glucose levels), the odds that an employee had blood glucose levels indicating diabetes generally decrease as their body mass improves, even with relatively small movements away from class III obesity. On average, about 8% of these class III obese employees had blood glucose levels indicating diabetes, and 34% had levels indicating prediabetes. This is significantly higher than the estimated proportion among class II obese employees and twice the estimated proportion for overweight employees. By the same token, estimated diabetes rates among employees with a healthy weight are only 75% of the estimated rate for overweight employees.

These results corroborate that even moderate weight loss can produce tangible improvements in blood glucose levels, even among employees who are not receiving any professional treatment for diabetes.
For example, the CDC estimates that pre-diabetic employees who lose 5-7% of their body weight and exercise moderately for at least 150 minutes each week can minimize their chances of developing Type 2 diabetes by 58%. In addition to diet and exercise, coping skills can bolster the effects of these lifestyle changes and help employees better cope with stressors that might lead to lower exercise and poorer diets over the long run.

**Actively promote disease management.** Diet, exercise and coping skills can continue to be effective for individuals already diagnosed with Type 2 diabetes. Different types of insulin control mechanisms and medication may also be added at this stage. Employers should be aware that proper disease management requires excellent care coordination among multiple providers and active involvement in treatment on the part of diabetic employees. Case management support becomes an important component of care to help individuals adhere to their treatment regimen and, perhaps, even reverse the Type 2 diabetes diagnosis. Again the CDC estimates that fairly modest changes in lab results achieved through treatment and lifestyle changes can have dramatic effects on health-related outcomes:

- Reducing A1c (a measure of blood glucose control) by one percentage point can reduce the risk of eye, kidney, and nerve diseases by 40%.
- Controlling blood pressure can reduce the risk of heart disease and stroke by 33%–50% and the risk of eye, kidney, and nerve diseases by 33%.
- Improving control of low-density lipoprotein (LDL) cholesterol can reduce cardiovascular complications by 20%–50%. Treating diabetic eye disease with laser therapy can reduce the risk of loss of eyesight by 50%–60%.
- Accessing comprehensive foot care programs can reduce amputation rates by 45%–85%.

**Time to Act**

Given the ever-increasing rate of diabetes in the working age population and the potential for outcomes – including absence, reduced performance, disability and premature death – the time for employers to act is now. Introduce clinical screening programs to determine whether you have a looming time bomb. Begin the process of defusing that time bomb by adopting lifestyle intervention programs for those in the pre-diabetic stage and targeted disease management for those already diagnosed. Finally, broadly measure the results of your interventions so you can show the full value of your programs.

These same programs – with their emphasis on diet, exercise and coping skills – will also go a long way towards keeping healthy workers healthy as well and supporting an overall culture of health in your company.

---