**INTRODUCTION**

“Obesity represents a large and increasing public health problem, being a risk factor for overall mortality and for most chronic diseases, including cancer, diabetes mellitus, cardiovascular disease, and musculoskeletal disorders…Increasing body mass index (BMI)…is associated with greater costs to employee health plans, with obese workers having up to 21% higher health care costs compared with those of recommended weight. In 1994, the estimated cost of obesity to US businesses was $12.7 billion, including $7.7 billion in health care costs alone.”

These statements from a recent Duke University study summarize the devastating impact of obesity on not only the health of individuals but also the cost to employers and society as a whole.

The results of this retrospective study of 11,728 employees at Duke University—34,858 full-time equivalents—revealed a clear linear relationship between obesity and workers’ compensation claims, costs and lost workdays. The greater the obesity, the higher the claims cost and lost time. This dramatic relationship is illustrated in Figure 1, where workers with the highest BMI had almost double the cost in medical claims, more than 7.5X workers comp costs, and a staggeringly approximately 12 X lost time when compared to workers at recommended weight, or normal BMI.

According to a National Health Statistics Report published in May 2009, there is a relationship between increasing BMI and prevalence of Metabolic Syndrome. “BMI,” or Body Mass Index, is a number calculated from a person’s height and weight that correlates with the amount of body fat for most individuals. “Metabolic Syndrome” is a collection of risk factors that increases your chance of developing diabetes or heart disease or having a stroke and many other diseases and conditions. Abnormal glucose (blood sugar), triglycerides (blood fat), HDL (“good”) cholesterol, blood pressure and waist measurement are the risk factors known as Metabolic Syndrome. In the study, overweight men were about 6X more likely to have Metabolic Syndrome (three or more risk factors), but obese men were 32X more likely. Overweight women were more than 5X likely to have Metabolic Syndrome and obese women were more than 17X likely. As BMI increased, the prevalence for each of the five risk factors for Metabolic Syndrome increased for both men and women.

**FIGURE 1: THE COST OF OBESITY**

Clearly, moving an individual into a lower BMI class saves dollars as well as lives.
STUDY DESIGN

Biometric screenings for the five risk factors for Metabolic Syndrome were conducted before and after a ten-week wellness program for 2,349 working adults with a BMI classification of obesity (30.0 or higher). Participants were employees from 44 different companies across the US. Some companies included participants who were spouses/domestic partners of the employees. Both industry and size of the companies were diverse. Employers included universities and school districts, energy and technology companies, municipalities, hospital systems and insurance carriers, transportation and retail industries, and others.

There were 1,595 participants, or 68%, who had Metabolic Syndrome, or at least three of the five risk factors.

The wellness program was a behavioral-based Metabolic Syndrome program targeting eating behavior and weight loss. Two of the ten class sessions targeted emotional and stress-related eating behaviors and included tools to identify alternative coping behaviors instead of eating.

Participants were divided into the following cohorts based on the results of the pre-program biometric screenings. BMI was classified according to the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), as seen in the literature.1

- Obese – BMI 30.0 or higher
- Grade I Obesity—BMI 30 <35
- Grade II Obesity—BMI 35 < 40
- Grade III Obesity—BMI 40.0 or higher

Participants were screened for the identical Metabolic Syndrome risk factors at the end of the ten-week program, and results were analyzed.

RESULTS

Figure 2 illustrates the successful results for all classifications of obesity at the end of the ten-week wellness program.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Obesity I</th>
<th>Obesity II</th>
<th>Obesity III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count at Beginning</td>
<td>1043</td>
<td>695</td>
<td>611</td>
</tr>
<tr>
<td>% Improved Waist</td>
<td>79%</td>
<td>78%</td>
<td>77%</td>
</tr>
<tr>
<td>% Improved Blood Pressure</td>
<td>54%</td>
<td>56%</td>
<td>60%</td>
</tr>
<tr>
<td>% Improved Triglycerides</td>
<td>67%</td>
<td>77%</td>
<td>65%</td>
</tr>
<tr>
<td>% Improved Glucose</td>
<td>54%</td>
<td>65%</td>
<td>55%</td>
</tr>
<tr>
<td>% Improved HDL</td>
<td>52%</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>% with MetS Pre</td>
<td>60.6%</td>
<td>69.8%</td>
<td>78.2%</td>
</tr>
<tr>
<td>% with MetS Post</td>
<td>37.9%</td>
<td>52.2%</td>
<td>63.1%</td>
</tr>
<tr>
<td>Average Weight Pre</td>
<td>205.3</td>
<td>232.0</td>
<td>274.2</td>
</tr>
<tr>
<td>Average Weight Post</td>
<td>194.3</td>
<td>219.5</td>
<td>261.1</td>
</tr>
<tr>
<td>Average Weight Loss</td>
<td>11.0</td>
<td>12.5</td>
<td>13.1</td>
</tr>
<tr>
<td>Average Weight Loss (%)</td>
<td>5.4%</td>
<td>5.4%</td>
<td>4.8%</td>
</tr>
<tr>
<td>% Improved BMI Class</td>
<td>38%</td>
<td>48%</td>
<td>28%</td>
</tr>
</tbody>
</table>

**Estimated Claims Savings**

- $353,800
- $290,455
- $294,485

*Estimated Claims Savings was calculated using medical and pharmaceutical savings per unit of BMI and measured BMI improvement from pre- to post-program.*

Participants in all Obesity Classes Reversed Metabolic Syndrome and Its Risk Factors

There were 1,595 obese participants who started the program with Metabolic Syndrome. The prevalence of Metabolic Syndrome was reduced in all three categories of obesity. Only 61.8% of all obese participants who started with Metabolic Syndrome still had Metabolic Syndrome at the post-program screenings.

- Metabolic Syndrome was reversed by 38.2%.
- Metabolic Syndrome was reversed by 28.4% for the highest weight class—BMI 40.0 or higher.
The percentage of all BMI weight classes who had each of the five risk factors for Metabolic Syndrome was reduced at the end of the program. Most significantly, the greatest impact of the program on Metabolic Syndrome risk factors was on triglycerides (a type of cholesterol) and blood pressure. The participants with Metabolic Syndrome realized the greatest reduction.

- The number of persons with elevated triglycerides as a risk factor decreased by 36%.
- The number of persons with elevated blood pressure readings as a risk factor was reduced by 30%.

The percentage who improved each of the five risk factors was well above half with the exception of improvement of HDL (“good” cholesterol), which was at 49%. Figure 3 illustrates the dramatic improvement for each of the Metabolic Syndrome risk factors.

Participants in all Obesity Classes Lost Weight and Reduced BMI

- Obesity Grade I participants lost an average of 11.0 pounds, or 5.4% body weight in ten weeks.
- Obesity Grade II participants lost an average of 12.5 pounds, or 5.4% body weight.
- Obesity Grade III participants lost an average of 13.1 pounds, or 4.8% body weight.

This weight loss resulted in the reduction of BMI classification for more than 38% of all obese participants, and potentially, the reduction of medical claims cost, workers comp cost, and lost time.

Fasting Glucose Levels Improved After Ten Weeks

For the 2,349 participants, the ten-week wellness program resulted not only in significant weight loss and reduction of Metabolic Syndrome and its risk factors, but also in significant improvement of diabetes glucose levels and risk for diabetes. This was true for all three classifications of obesity, including grade III, the highest BMI class—40 or above. Figure 4 illustrates the positive change in glucose levels at the end of the program for all obese participants.

Blood Pressure Readings Improved After Ten Weeks

Blood pressure improved across all three BMI classes.

- The number of persons with a normal blood pressure reading increased by 55%.
- The number of persons with a hypertensive (high blood pressure) reading decreased by 38.1%.

Sustainability of Weight Lost

Follow-up screenings are ongoing. At the time of this writing, weights have been measured for 533 of the 2,349 obese participants from nine to 14 months post-program. 55% of the participants have either stayed within three pounds of their post-program weight or continued to lose more than three pounds of additional weight.
CONCLUSIONS

• A ten-week Metabolic Syndrome wellness program reduced risk for developing diseases and chronic conditions by reducing Metabolic Syndrome and all five of the Metabolic Syndrome risk factors for obese participants, including the highest class of obesity—grade III.
• Significant, sustainable weight loss was achieved in all classes of obesity, impacting not only disease risk, but also medical claims, workers comp and lost time costs.
• Severity of obesity was significantly reduced according to BMI classification.
• Reversal of obesity to non-obese BMI was achieved for some participants by the end of the ten-week program.

REFERENCES


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Janice Bartos supports wellness engagements and manages wellness-related projects for Trajectory Health, LLC. Since the first day of her professional nursing career more than 30 years ago, Bartos has been working with persons with heart disease and diabetes to help them reduce their risk factors for these diseases—a role that she continues in her current position as clinical consultant.

Prior to joining Trajectory Health, she had worked as a critical care nurse, nursing supervisor, staff development instructor, nursing instructor and consumer educator. In addition, Bartos was a Clinical Research Coordinator at University Hospitals Case Medical Center in Cleveland, Ohio, before relocating to Dallas, Texas in November 2007. Her prior experience has allowed her to excel at the evaluation and implementation of various clinical programs such as diabetes, smoking cessation, cardiovascular, weight management and stress management.

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