
Business Case & Supporting Evidence for REVERSING METABOLIC SYNDROME

Metabolic syndrome (MetS) is a constellation of clinical factors that are highly correlated with existing and/or future chronic disease. There are 5 factors in metabolic syndrome: elevated waist circumference (body mass index is often used as a proxy when this data is unavailable), elevated blood pressure, high triglycerides, low HDL cholesterol, and impaired fasting glucose. If 3 or more of those 5 factors are present, the individual meets criteria for MetS.

Individuals with MetS have a 5 times higher risk of developing diabetes¹ and double the risk of cardiovascular disease, cardiovascular mortality, and MI² compared to those without MetS. Further, in a meta-analysis of 116 datasets including 38,940 cancer cases, Esposito et al. found that metabolic syndrome was associated with increased risk of liver, colorectal, bladder, endometrial, pancreatic and breast cancers.³ In addition, 3 out of 5 people with MetS have severe obstructive sleep apnea (OSA).⁴ OSA is a common cause of excessive daytime sleepiness, which doubles the risk of work-related injuries.⁵

Although MetS affects 1 out of 3 adults in the US population⁶ and is just as prevalent as obesity, it has gone relatively under-recognized. Appreciating the distinction between obesity and MetS is critical to identifying the highest-risk individuals in a population who need help with intensive lifestyle change. Obesity is defined primarily by body mass index, a function of height and weight. Since body weight reflects both lean and fat mass, this measure does not directly

reflect one's metabolic state or chronic disease risk. On the other hand, the factors of MetS are directly related to the pathophysiology of insulin resistance and development of chronic disease.⁷ Obesity is indeed related to one of the factors of MetS, waist circumference, but it is not the defining feature of MetS. In fact, the a monocular focus on obesity misses individuals who are of normal weight but still have MetS-associated health risks and may over-estimate the risk of obese individuals who are metabolically healthy. In fact, Wildman et al. found that approximately one-quarter of normal-weight individuals had 2 or more cardiometabolic risk factors while almost one-third of obese individuals were metabolically healthy.⁸

Moreover, Burton et al. (slide below) found that within an employee population, 39% of the population with MetS did not have central obesity.⁹ A portion of this high-risk population could be easily missed if obesity was used as the only indicator of disease risk. The group also found that those who had central obesity with MetS had a 60% increased odds of reporting poorer health, 12% increased odds of 3 or more sick days, and 24% increased odds of work limitation (presenteeism) than those with central obesity without MetS.

Metabolic Syndrome is Broader Than Just (Pre)diabetes and Obesity

- 52% of people with metabolic syndrome have NORMAL fasting glucose
- 39% of people with metabolic syndrome have a NORMAL waist circumference

MetS also carries higher morbidity and direct health care costs compared to obesity alone. According to data from Kaiser Permanente on 57,420 patient lives (slide below), those with MetS had greater incidence of diabetes and cardiac hospitalization within 5 years than those with either obesity or impaired fasting glucose alone. Individuals with MetS were almost 3 times more costly than those with obesity alone.¹⁰

Metabolic Syndrome Leads to Greater Morbidity and Higher Costs

	Developed Diabetes within 5 years	Cardiac Hospitalization within 5 years	Cost Coefficient (relative costs)
Impaired Fasting Glucose Alone	4.3%	3.0%	-\$15
Obesity Alone	1.0%	1.7%	\$588
Metabolic Syndrome	11.3%	5.7%	\$1602

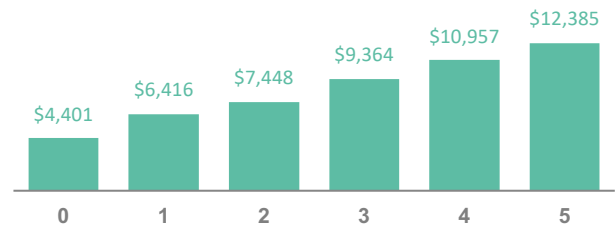
In one of the largest studies on the direct healthcare costs of MetS examining over 170,000 patients (slide

below with costs adjusted for inflation), Boudreau et al. found that with each additional MetS factor, direct healthcare costs increase by 24%. Even when stratified by diabetes, diabetics with MetS are 30% more costly than diabetics without MetS.¹¹

Metabolic Syndrome Driving Costs

Healthcare Costs per Factor of Metabolic Syndrome

• Costs increase by 24% per additional factor...



In an employee population, total costs (combined health care, pharmacy, and short-term disability costs) among those with MetS and chronic disease were almost 4 times higher than those without MetS and without chronic disease.¹² The good news is that reversal of MetS factors over time has been shown to have a direct impact on costs. Employees who reduced the greatest number of MetS risks over a 2-year period had the greatest cost savings (approximately \$580 when adjusted for inflation) and those who increased the greatest number of MetS factors had the largest increase in costs (approximately \$1800 when adjusted for inflation).¹³

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