

Predicting Worker's Compensation outcomes by Organizational, and Health Population Data Modeling

A.M.Colombi MD MPH

Introduction

Worker's Compensation provides wage-loss and medical benefits to employees who become ill or injured through the course of their employment.

We probed the worksite wellness, health risk, and worker's compensation outcomes in 30 working populations. The interactions of Obesity, Wellness Interventions, Worker's Compensation (WC), and Depression were profiled in prediction models in order to support health investment decisions.

Screening, and modeling techniques from JMP allowed using historical and population data, to prioritize health investments.

Methods

Obesity Prevalence Risk (OPR) was defined as the worksite percentage of Health Risk Assessment respondents reporting a Body Mass Index of 30 or more.

Worksites with Obesity prevalence above the median (0.34) were defined as High OPR Risk (n.14 worksites). Worksites with an Obesity prevalence equal or less than the median were defined as Low risk (n.16 worksites). All the claims of the employees working in the worksites categorized as HIGH OPR were processed separately and compared with the claims of those working in LOW OPR worksites.

Results

High OPR worksites had higher 5 yrs average Medical and Wage (M&W)WC payments/case following an injury. This was the case for all Injury types and for musculoskeletal injuries, excluding or not large claims, and controlling for worksite size.

For all types of injuries, the mean M&W- WC payment/case in High OPR worksites was \$ 7048.59 (95% C.I. 5532.6- 8564.6) vs. \$ 3223.24 (95% C.I. 1805.2 -4641.3) for the Low ones. A 2.19 times difference (p 0.0008).

For musculoskeletal injuries, the mean M&W- WC payment/case in High OPR worksites was \$ 9597.14 (95% C.I. 6553.3- 12641), vs. \$4351.49 (95% C.I. 1504.2- 7199). for Low ones. A 2.21 times difference (p 0.015)

Excluding Large claims (>\$ 50,000), the High / Low WC payment/case ratio, is reduced to 1.5 for all injuries and to 1.4 for musculoskeletal . A still significant difference (p 0.018 and 0.041)

Longitudinal trends for the years 2004-2007 showed that the High OPR worksites had significantly higher trends in several WC metrics.

The 2004-2007 average annual WC case rate per 100 employees was 1.96 higher in the High OPR subset . The mean Case Rate was 6.3 (95% C.I. 5.1 -7.5) for the High vs. 3.21 (95 % C.I. 1.9 - 4.5) for the Low subset. (p 0.005)

The 2004-2007 average annual M&W-WC Payment per Case was 2.56 higher in the High OPR subset . The mean payment per case for was \$ 3,532.66 (95% C.I. 2730.2 -4335.1) for the High vs. \$ 1,379.13 (95 % C.I. 576.6 - 2181.6) for the Low subset. (p 0.0035).

The 2004-2007 average annual number of Lost Work days due to WC claims was 2.36 times higher in the High OPR subset . The mean number of lost days was 49,590 (95% C.I. 36,458 – 62,722) for the High, vs. 20,936 (95 % C.I. 7805 - 34068) for the Low subset. (p 0.009). This is equivalent to an excess High –Low of 78 Full time employees loss.

More importantly, Obesity did not influence the worksite WC experience in isolation.

Predictive modeling including information about worksite wellness programs and worksite aggregate health risk assessment profile , revealed that 74% of the variance in worksite (5yrs) average M&W -WC payment / case was explained , in addition to Obesity Prevalence , by the intensity of Physical Activity and Muscle-Bone health worksite programs , and by the overall Worksite Wellness Proficiency.

Each of these factors was individually significant. All other factors being unchanged , High OPR determines a average worksite WC payment of \$ 7701.13 +/- 1159.22, vs. a payment of \$ 3020.75 +/- 1027.1 when OPR is Low, a 60.8% reduction. If, other factors unchanged , the worksite Physical activity promotion score were to improve from its median (0.36) to its max potential of 1, that would reduce the WC payment to \$ 5762.24 +/- 1520.61, or by 25.2%.

If the worksite wellness proficiency score were to improve from the median (0.65) to its max potential of 1, that would reduce the worksite WC payment to \$ 6842.71 +/- 1095.57 , or by 11.1%

On the contrary , a 20% increase of the worksite WC payment from its median value, would induce a more intense Health-Bone promotion program (ergonomics and return to work)moving its score from its median (0.55) to a higher value of 0.82.

The simultaneous interactions of the factors would lead to a vast spectrum of permutations .

Worksite based measures of Mental Health were also considered. Depression screening is the activity by which those who may have the condition are identified. Depression co-morbidity is the actual

condition being treated. When depression screening is included in the predictive modeling, Percent Screened for Depression and Percent reporting a Neutral Stress and Satisfaction Offset Score did interact significantly with worksite Obesity Prevalence in predicting 49% of the variance of the average worksite Medical +Wage WC compensation.

When depression co-morbidity is considered, then, besides Obesity prevalence, the N. admitted to hospital for acute depression, Depressed Patients rate, Mental health services use, and the frequency of reporting a negative Business Culture do explain 77% of the variance of the average worksite Medical +Wage WC compensation.

In this data series 44% of WC claims relate to Musculoskeletal types of injuries. It was therefore important to test the relationship of depression to musculoskeletal co-morbidity.

Annual trends in Depression episode rate and severity / risk adjusted payment per episodes, show significant differences whether musculoskeletal disorders (MSD) co-morbidity is present or not. On average the group with concomitant MSD had a 65.5% higher Depression episodes rate and 8.2% higher treatment costs than the non-MSD group.

Conclusions

JMP was useful in allowing Data reduction, predictive modeling, easy visualization of statistical analysis. The ability to analyze, on a population basis, such diverse determinants as worksite business culture, wellness programs, population health risk and cost outcomes, allowed an analysis of the entire spectrum from health to disability and discover those critical factors that significantly influence outcomes, supporting relevant decisions.