
A Prospective Study of a Macroergonomics Process over Five Years Demonstrates Significant Prevention of Workers' Compensation Claims Resulting in Projected Savings

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Abstract This prospective study shows the effect of a macroergonomics process on a large government organization of 4500 employees who primarily work at a computer workstation and are relatively “healthy” but often report symptoms to the neck, upper extremities (UE) and/or back. The Worksite International Ergonomics ProcessSM (WIEP) was implemented over a 5 year period from 2009-2013 to address rising repetitive motion injury rates and involves approximately 1550 employees directly. The results show that an early symptom reporting process minimizes workers' compensation claim filing, reduces costs and keeps employees safer, healthier and productive in the work place.

Keywords Macroergonomics, repetitive motion injuries (RMI), early symptoms reporting, Return on Investment (ROI)

1. INTRODUCTION

The health and productivity (H&P) movement is rapidly advancing worldwide in industrialized companies. In the United States, organizations are concerned about employee lifestyle issues such as stress, obesity and lack of physical activity resulting in increased employee illness, rising medical costs, lost productivity due to unplanned absence and decreased efficiency at work. Managing lifestyle risk factors is a top priority in that employers want to develop a workplace culture where employees are responsible for their health and understand its importance. (Towers Watson, 2014).

Worker health is the “internal temperature gauge” of organizational health. Establishing a culture of health is a top priority and essential for success. The National Business Group on Health recently stated that employers who have H&P programs are able to reduce disability days by between 10% and 35%, improve return to work (RTW) rates by at least 6% and experience a return on investment (ROI) ranging from 3:1 to 15:1. Within six months, many are able to demonstrate reduced lost time, decreased incidence and lower absence rates (Watson Wyatt Worldwide, 2009).

In the USA, workers' compensation and disability costs continue to impact businesses daily. Overexertion injuries including repetitive motion is the most common work-related disabling injury. Many of these injuries when

investigated identify co-morbidities of employee obesity, inactivity and workplace stress among other risk factors as contributing to the claim. The estimated direct costs to business in 2005 for overexertion injuries was \$12.7 billion. In 2009, there were 3.2 million overexertion injuries in the United States averaging one per 100 people. Eliminating or controlling repetitive motion injuries is approximated to save a company \$27,700 per case (National Business Group on Health, 2011).

Employers continue to seek ways to engage employees in healthy behaviors. Proactive ergonomics programs focus on addressing workplace risk factors that may cause stress and strain on employees potentially leading to or exacerbating musculoskeletal problems. Using a macroergonomics approach to develop and manage an ergonomics process is one of the most effective ways to proactively prevent, mitigate and manage musculoskeletal injuries and illnesses in the workplace, work-related or not. It will reduce claim frequency, severity and the associated direct and indirect costs (Heller-Ono, 2009).

The goal of macroergonomics is a fully harmonized work system at both the organizational and individual ergonomic level which results in improved productivity, job satisfaction, health and safety and employee commitment; all desirable goals of a H&P program. Macroergonomics is a balanced

model where all elements interact around the human to include tasks, organization, environment and tools/technology as shown in Figure 1. When all elements fit together, there is harmony in the workplace; if not, safety, productivity, efficiency, quality and employee satisfaction will be impacted (Freivalds, 2005).

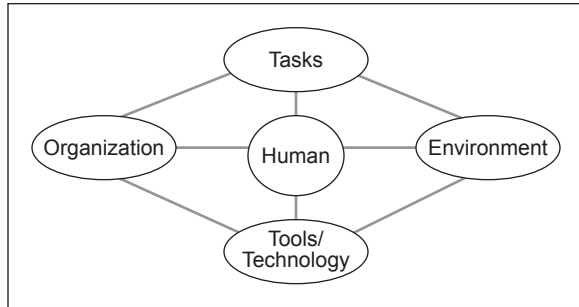


Figure 1. Macroergonomics is a balanced model where all elements interact.

The Worksite International Ergonomics ProcessSM (WIEP) is based on the theory of macroergonomics and focuses on the design of the overall work system from the “top down” striving for continuous improvement. It also takes a “bottom up” approach by engaging employees in the process from the beginning and a “middle-out” approach by involving middle management to ensure accountability in the process as suggested by Hendrick (Hendrick et al, 2001). It is a lean, proactive, integrated and participative, organizational process that is designed to prevent and manage work injuries as quickly and effectively as possible (Heller-Ono, 2009). This five year study demonstrates the impact of a macroergonomics process in preventing workers’ compensation claims resulting in significant organizational change and financial benefits.

2. METHODS

The WIEP is based on various business theories and ergonomics models that promote efficiency and effectiveness within an organization to “operationalize” ergonomics as part of the routine day to day management of employee health and wellbeing. Already mentioned is Hedrick’s model of macroergonomics. Other theories include Noro and Imada’s “participatory ergonomics” approach which involves employees (end users) as stakeholders in the analysis and design of their work environments and work activities (Noro and Imada, 1991). Quality management and continuous improvement of the WIEP is based on theories proposed by Dr. E. Deming, where all steps within the process work together toward quality that the ultimate “customer” will boast about (Deming, 1986). Lean manufacturing principles help eliminate waste, errors and

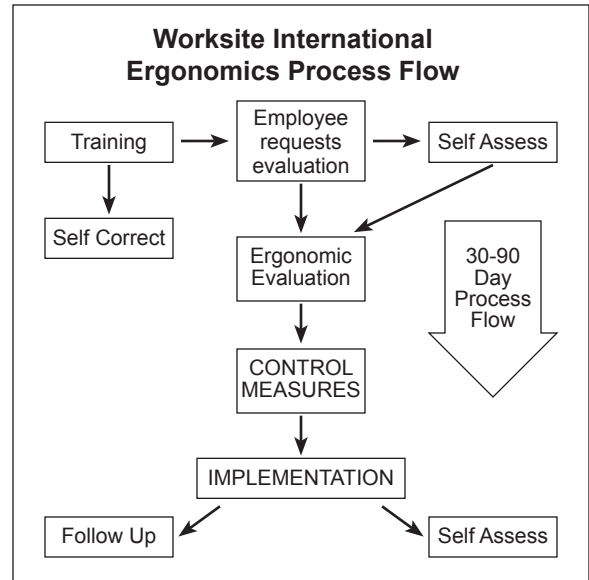


Figure 2. Worksite International Ergonomics Process flow.

unnecessary actions and include only those value-added components to enhance the process flow (Liker, 2004). Figure 2 shows a simplified version of the WIEP flow. The Ergonomics Manager (EM) is responsible for all components of the process.

3. RESULTS

Prior to implementing the WIEP, the organization experienced approximately 438 RMI cases over a five year period at a cost of approximately \$7.6 million. Historically, this claim type was roughly 19% of all claims and 29% of all incurred costs. Results of the WIEP over five years shows a reduction of new RMI workers’ compensation (WC) claims by 45% with 200 less claims filed than in the preceding five years.

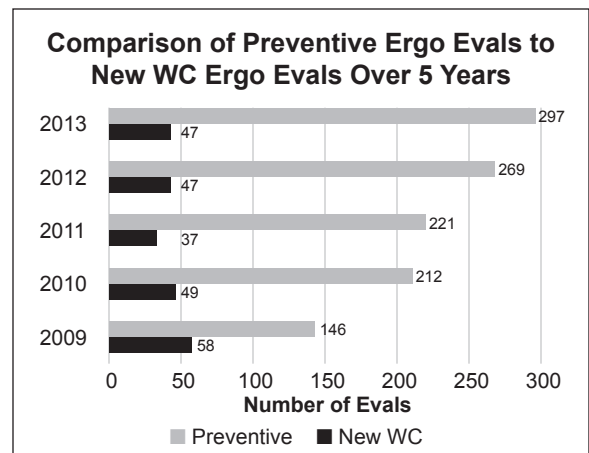


Figure 3. Comparison of preventive ergonomic evaluations to new WC ergonomic evaluations over 5 years.

Participation in the process is robust and has increased 61% since the first year of the program in 2009 where 232 employees were evaluated (all types) compared to 377 in 2013. Overall, there was a 51% increase in preventive evaluations performed over the same time period while new workers' compensation claims remained relatively constant as shown in Figure 3.

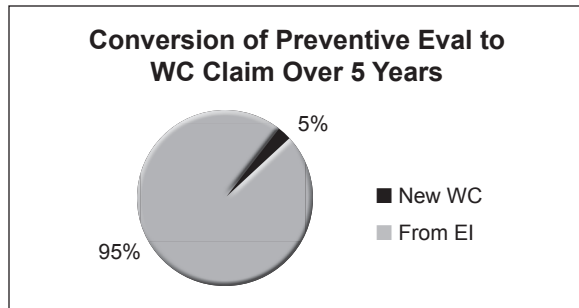


Figure 4. Conversion of preventive ergonomic evaluation to workers' compensation claim over 5 years.

Another important statistic is the conversion rate which measures the number of preventive evaluations (employees with symptoms) that convert to a workers' compensation claim within two years from the time the last preventive eval was performed. The conversion rate over a five year period was 61 cases of 1550 evaluations performed. Figure 4 shows the 5% conversion rate of preventive evals converting to new workers' compensation claims.

3.1 Process Costs

A budget to support the WIEP was prepared every fiscal year. A conservative amount of \$160,000 was estimated for the first year. As participation increased, so did costs. By year five, the investment had increased 34% to approximately

\$240,000.00 which covered all preventive and workers' compensation purchase costs, new chair purchases and all consulting fees for evaluation and training services. Over five years, the investment was \$967,483.00. Based on the total number of evaluations performed over this period (1550), the average investment per person in the process is \$625.00 which includes the evaluation, training participation and all approved purchases.

3.2 Return on Investment

Calculating Return on Investment (ROI), sometimes called Rate of Return, is a very common way to help employers understand the value a proposed solution will bring. The calculations are typically straightforward and compares the financial benefits of a proposed solution to its costs. (Budnick, 2012). To determine a ROI for the WIEP, the formula used is defined in Figure 5 with some modifications (Heller-Ono, 2006). Since workers' compensation claims are categorized as medical only and indemnity with significant variation in cost, the formula is further broken down using Pareto Analysis where 80% of the costs are associated with 20% of the (indemnity) cases. It is projected that had it not been for the WIEP, most preventive evals would have converted to WC claims with 80% going to medical only and approximately 20% to indemnity type claims.

$$\frac{\text{Average company RMI workers' compensation costs per claim} \times \text{\#Preventive evaluations performed}}{\text{Annual investment in the process}}$$

Figure 5. Return on Investment formula.



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Alison Heller-Ono is the founder, President and CEO of Worksite International, Inc. since 1993. Alison received her BA in Biology followed by her MS in Physical Therapy (PT) in 1987 and worked as a clinical PT until 1996 helping injured workers return to work (RTW). During this time, Alison discovered her true passion for injury prevention helping injured employees RTW along with educating employers on how to prevent and manage injuries more effectively. In 1996, she became a board Certified Industrial Ergonomist as well as a Certified Disability Analyst (CDA). In 2001, Alison earned her Certified Management Consultant (CMC) through the Institute for Management Consulting. In 2009, she earned her board certification as a Certified Professional Ergonomist (CPE) and in 2013 she was credentialed as a Certified Professional Disability Manager (CPDM). From 2008-2013, Ms. Heller-Ono was the Ergonomics Manager for a large government agency. During that time, she developed and managed a comprehensive ergonomics process that prevented over 1000 injuries at a savings of \$10.00 for every \$1.00 invested and reduced RMI claims by 45% resulting in a projected savings of \$15 million over five years. Alison's professional background, experience and passion makes her uniquely qualified to assist employers with health, absence and productivity management in today's workplace.

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WIEP ROI Calculations	
WIEP All Years	2009-2013
Total All Cases (WC+ Preventive)	1550
Total All Preventive	1145
Preventive to WC Conversion	61
Number of WC claims prevented - conversion	1084
Med Only (80%) (All Prev. x80%) x \$MO (\$3725.00)	868 X \$MO
Indemnity (20%) (All Prev. x20%) x \$Indemnity (\$55,575.00)	216 X \$Indemnity
Projected \$ Savings in Claims Prevented	\$15,650,946.00
Total program costs (+ EM Salary \$120K/year) over 5 years	\$1,567,483.00

Table 1. WIEP ROI Calculations

3.3 Projected Savings

Based on the formula used, an average Return on Investment using the WIEP macroergonomics process is estimated to save the organization approximately \$10.00 for every \$1.00 invested.

4. DISCUSSION AND CONCLUSION

The WIEP macroergonomics process described is iterative (design, evaluate, refine, reevaluate, further refine, etc.), nonlinear (does not proceed in a simple sequential manner), and stochastic (requires making inferences or decisions based on incomplete data). This is not a pure process (Hendrick et al, 2001). Obtaining the average cost of claims is difficult and often requires using benchmark data from state or insurance resources. The more real the actual cost figures provided, the more accurate the financial analysis is

for the employer (Heller-Ono, 2009). Despite the difficulties one can experience with data of this kind, it is obvious that establishing a macroergonomics process and encouraging participation of employees early by offering ergonomic analysis and training routinely helps to make ergonomics a “keystone habit” where a “small win” helps other habits to flourish driving widespread cultural change (Duhigg, 2012).

It is estimated that over 65-70% of the organization has participated in the ergonomics process by engaging in office ergonomics and back safety training and ergonomic evaluations. Observation of coworkers participating in the WIEP; hearing their remarks of how much better they felt, leveraging their experience and in turn, encouraging others to participate ultimately drives cultural change resulting in robust individual and organizational benefit and financial savings.

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