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Breaking Through the Musculoskeletal Injury Plateau
Preventing Microtrauma Injuries

More Complicated Than Ever
Examining the Bill Review Process

Which Financial Program Is Right for Your Company?
A Review of Insurance Options

Avoiding Problem Claims
A Look at Some Compensability Issues

COLUMNS

OSHA Outlook
Obesity in the Workplace

NCCI Notes
Would Claims Be Affected by a Recession?

Commentary
Introduction to the New Work Disability Prevention Paradigm

From the Courts
Developing Case Law
BREAKING THROUGH THE MUSCULOSKELETAL INJURY PLATEAU: A REPORT

TRENTON SHUFORD, DANIEL NELSON, AND JON SIEGEL

INTRODUCTION

The American manufacturing industry has made significant strides over the past 50 years in the area of worker protection. Whether mandated by government agencies or by economic and human resources drivers, safety programs have gone far to reduce fatalities and injuries in the workplace.

Yet further examination of the injury data available indicates that areas exist where substantial improvements may yet be made. According to a Bureau of Labor Statistics report for 2006, “Sprains and strains was (sic) the leading nature of injury and illness in every major industry sector.” Sprains, strains, microtrauma, and repetitive stress injuries contribute significantly to the overall cost of injuries in the workplace. It is in this area that significant
improvements in injury reduction can be made. This article describes the genesis and results of a focused program, called the Employee Maintenance Center, which is designed to meet four key objectives:

1. Reduce musculoskeletal injuries in the workplace
2. Reduce workers compensation and related costs
3. Identify and reduce risk
4. Increase worker productivity

In 2005, Kimberly-Clark’s Conway, Arkansas, manufacturing facility launched a pilot program with InjuryFree, Inc., to reduce musculoskeletal injuries in the workplace, particularly those injuries resulting from microtrauma and repetitive stress. After three years of continuous program operation, injuries and related costs at the Conway facility have shown a significant and steady decline. This article is a description of that three-year program and a report of its results.

**Nature of Workplace Injuries (Simplified)**

Medical professionals see injured workers on a regular basis during the normal course of their medical practices, treating those workers for a wide variety of workplace injuries. It is known from available data that the natures of those injuries are of two general forms.

1. “Impact” or “macrotrauma” injuries are often the result of a safety infraction of some kind (for example, a lock-out box wasn’t used properly, safety glasses may not have been worn, a cutting tool was used in an improper manner, etc.). These injuries are of many types, but include fractures, lacerations, contusions, punctures, and amputations.

2. “Overexertion” or “microtrauma” and repetitive stress injuries are typically caused by work tasks that require frequently repeated movements or stresses and are common in manufacturing and assembly line work operations. For purposes of clarity and simplicity, this document will refer to an entire family of injury types as injury by “microtrauma.” These are “microtraumatic” in nature in that they may not be readily identified because of their subtle or delayed onset. Terms such as “strains” and “sprains” are frequently used to describe an acute microtrauma or overexertion injury. Repeated episodes of sprains and strains produce a pattern of tissue inflammation that is often the precursor of chronic
injury. Microtrauma injuries are often referred to by other names, including repetitive strain (or stress) injury (RSI), cumulative trauma disorder (CTD), and musculoskeletal disorder (MSD). The Bureau of Labor Statistics defines an MSD as, “an injury or disorder of the muscles, nerves, tendons, joints, cartilage, or spinal discs. MSDs do not include disorders caused by slips, trips, falls, motor vehicle accidents, or similar accidents.” Further, “MSDs include cases where the nature of the injury or illness is sprains, strains, tears; back pain, hurt back; soreness, pain, hurt, except the back; carpal tunnel syndrome; hernia; or musculoskeletal system and connective tissue diseases and disorders, when the event of exposure leading to the injury or illness is bodily reaction/bending, climbing, crawling, reaching, twisting; overexertion; or repetition.”

Identification and treatment of macrotrauma injuries is generally reasonably straightforward. A laceration, for example, may be easy to identify and treat. Recovery and return-to-work timing for such an injury can be predictable. Sutures are placed, a bandage is secured, necessary cautions are voiced, and the worker, depending on the severity of the injury, may be back at work that very day. Of course, more severe injuries will require longer recovery times, but the point is that macrotrauma injuries often have predictable return-to-work cycle times or, in a severe case, a clearly defined partial or complete disability. Comparatively simple treatments and rapid recovery times often make for a less expensive injury, as well.

Contrarily, microtrauma and repetitive stress injuries may appear much less dramatic than certain macrotrauma injuries, but they often present more complex and expensive challenges. A carpal tunnel injury provides an excellent example. Imagine that a manufacturing worker is required to make the same motion several thousand times each day at his or her workstation. This motion requires that a certain amount of muscular stress be exerted at the wrist. Over several months, this repetitive motion becomes irritating; the pain level increases until the worker is unable to sleep at night. In conversations with colleagues, the worker is told that he or she may have carpal tunnel syndrome and, as a result, files a claim and seeks treatment from a physician.

Whereas a laceration may be quickly treated and the worker may return to work relatively quickly, engaged in the exact same job tasks, the carpal tunnel worker may be told to completely avoid work for a period of time until healing can begin. According to the Bureau of Labor Statistics, MSD cases had a median of nine days away from work, two days longer than the
The median for all cases involving days away from work. Even more dramatically, employees with carpal tunnel syndrome experienced a median of 27 days away from work. Because of the very nature of microtrauma injury, cessation of causal work activity often becomes a mainstay of treatment. The work cessation period can be unpredictable.

The entire arena of microtrauma injury and treatment is fraught with confusing choices and unpredictable results. When presented with standard forms, treating physicians are asked to make work modification recommendations. Yet there is little opportunity to truly understand the nature of the work involved, the stresses inherent in a particular job, or the environmental and ergonomic realities of the workplace. Physicians will sometimes advise their patients to find a different job in order to prevent injury. But to many workers, that is an absurd recommendation. Workers rely on their established jobs for their livelihoods, their benefits, etc. So the worker returns to the job that caused the problem in the first place, further exacerbating an existing
**Exhibit 2**

**Number of Claims by Nature of Injury for 2006**

![Graph showing number of claims by nature of injury for 2006.](image)

Source: Bureau of Labor Statistics

**Exhibit 3**

**Estimated Total Medical Cost by Nature of Injury**

<table>
<thead>
<tr>
<th>Nature of Injury</th>
<th>Total Claims</th>
<th>Avg. Cost per Claim</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprains/Strains</td>
<td>1,418,210</td>
<td>$17,893</td>
<td>$25,376,031,530</td>
</tr>
<tr>
<td>Bruises/Contusions</td>
<td>303,770</td>
<td>$17,690</td>
<td>$5,373,691,300</td>
</tr>
<tr>
<td>Cuts/Lacerations</td>
<td>298,360</td>
<td>$16,081</td>
<td>$4,797,927,160</td>
</tr>
<tr>
<td>Fractures</td>
<td>282,330</td>
<td>$29,250</td>
<td>$8,258,152,500</td>
</tr>
<tr>
<td>Heat Burns</td>
<td>52,310</td>
<td>$20,971</td>
<td>$1,096,933,010</td>
</tr>
<tr>
<td>Carpal Tunnel</td>
<td>39,020</td>
<td>$17,971</td>
<td>$701,228,420</td>
</tr>
<tr>
<td>Tendonitis</td>
<td>14,260</td>
<td>$20,449</td>
<td>$291,602,740</td>
</tr>
<tr>
<td>Chemical Burns</td>
<td>22,470</td>
<td>$20,971</td>
<td>$471,218,370</td>
</tr>
<tr>
<td>Amputations</td>
<td>23,970</td>
<td>$42,637</td>
<td>$1,022,008,890</td>
</tr>
<tr>
<td>Multiple Traumatic Injuries</td>
<td>136,690</td>
<td>$26,649</td>
<td>$3,642,651,810</td>
</tr>
</tbody>
</table>

Note: These results were obtained by multiplying the costs per claim by nature of injury for 2004–2005 from the National Safety Council times the number of claims by nature of injury for 2006 from the Bureau of Labor Statistics.
microtrauma and finally ending up with a chronic injury.

The differences in treatment costs between macrotrauma and microtrauma injuries are substantial. To demonstrate the costs of injuries due to microtrauma, it is necessary to extrapolate from available data. Exhibit 1 shows the costs per claim by nature of injury for 2004 – 2005 as collected by the National Safety Council. Some of the injuries are microtrauma related; others are macrotrauma related. Exhibit 2 shows the number of claims by nature of injury for 2006, as defined by the Bureau of Labor Statistics.

Exhibit 3 combines the data of the two preceding charts and extrapolates the estimated costs of claims by nature of injury. It is clear that the costs associated with individual macrotrauma injuries are very high (amputation, for example). Yet it is equally clear that, due to the large number of microtrauma injuries, the total costs for dealing with microtrauma injuries are typically much higher than the costs associated with a wide range of macrotrauma injuries. Admittedly, combining data from different sources spanning different years is unusual and imperfect; but the extrapolation provides evidence of substantial cost and does not include whatever increases

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**Exhibit 4**

**Estimated Total Medical Cost by Nature of Injury**

Note: These results were obtained by multiplying the costs per claim by nature of injury for 2004–2005 from the National Safety Council times the number of claims by nature of injury for 2006 from the Bureau of Labor Statistics.
in health-care costs may have been realized in 2006 versus 2005.\(^8\) Bear in mind that the figures in this chart are hard treatment costs plus estimated costs for lost time, but do not include soft costs such as retraining, lost productivity, administrative costs, etc.

Days away from work also contribute significantly to the overall costs of injury. Exhibit 5 shows the median days away from work due to a variety of injuries.\(^9\)

**MOST SAFETY MEASURES ARE FOCUSED ON MACROTRAUMA, NOT MICROTRAUMA**

It is apparent that an opportunity exists to reduce injuries and their costs by focusing on the area of microtrauma. Yet today’s industrial safety programs are often geared more toward the work environment than the workers themselves. The implementation of lock-out procedures for potentially dangerous machinery and the use of team awareness (or “buddy systems”) to reduce the risk inherent in certain lifting tasks have gone far toward reducing workplace injuries. Injuries due to microtrauma, however,

**EXHIBIT 5**

**NONFATAL OCCUPATIONAL INJURIES AND ILLNESSES INVOLVING DAYS AWAY FROM WORK**

![Graph showing nonfatal occupational injuries and illnesses involving days away from work](image)

- Source: Bureau of Labor Statistics
tend to be difficult to prevent using conventional safety approaches. This is not to disparage effective safety programs. The reality is that most safety programs simply don’t have the tools or protocols to measure and usefully document the critically important biophysical markers of an individual worker’s risk.

Frustrated over an apparent inability to further reduce microtrauma injuries and their costs, much of the energy expended by industry today in reducing workers compensation costs is focused on controlling the costs of treatment, improving reporting mechanisms, and implementing sophisticated oversight and auditing procedures. While these efforts clearly contribute to reducing the total expense of workers compensation, these and other measures are geared largely at reducing costs after the injury has already occurred.

There is, however, renewed interest in attacking the problem from the prevention side of the equation. One attempted solution is the “wellness” approach. Most wellness programs tend to deal with the overall health of the employee. Many wellness programs emphasize weight management, smoking cessation, and general health screening. General wellness programs are predicated on the assumption that helping overweight employees, smokers, and the general worker population improve their lifestyles and overall health will tend to improve worker productivity, reduce lost workdays, and create greater worker satisfaction. While these are worthwhile goals, the typical wellness program fails to address the specific job and job tasks of the individual worker and does little, if anything, to address injury prevention.

**THE VISIONS: PREVENT MICROTRAUMA AND REPETITIVE STRESS INJURIES**

Year after year, microtrauma and repetitive stress are among the largest causes of injury in the workplace. An examination of injury data reported by the Bureau of Labor Statistics shows that microtrauma is the leading cause of workplace injuries in all workplace settings. The percentages of injuries caused by microtrauma are even higher in the manufacturing environment. In addition, older workers are more susceptible to injury due to microtrauma than are their younger co-workers. It is reasonable to conclude that workers compensation costs due to microtrauma will continue to increase as America’s work force continues to age. Exhibit 6 shows the median days of work lost by age. This is a dramatic reminder that as the work force ages, injury recovery time increases. Increased return-to-work times have a direct impact on overall cost of injuries. The need to create a new model for injury prevention has never been more apparent or more urgent.
Creating a new path to injury prevention in the workplace requires a new approach to the problem driven by several underlying assumptions:

1. The greatest opportunity for improved injury reduction in the workplace is in the area of microtrauma and repetitive stress injuries.

2. Prevention of microtrauma and repetitive stress injuries will require a comprehensive understanding of the physical requirement for each worker’s job task; these factors include muscle group strength, range of motion, and flexibility requirements.

3. The job task knowledge must include an understanding of the er-
gonomics related to the task. How does the worker interface with the work environment? How does the worker interact with the tools, machines, products, and materials being handled? How is the worker’s performance affected by large variations in environmental temperature?

4. Workers need to be educated so they can take greater responsibility for their own physical health.

5. Employers need to be actively engaged in raising awareness of health and safety issues among their workers. Employers need to be willing to provide the facilities and mechanisms required for successful injury prevention.

6. When a worker's strength or flexibility falls short of the job task, a mechanism must be available to assist that worker in reaching or regaining the physical capabilities required of the task.

7. Workers are not static organisms. They age, and as they age, their physical capabilities change.

Creating the program that incorporates all of these assumptions has been a 10-year-long task. In 1997, the first implementation of what today is known as the Employee Maintenance Center (EMC) was launched. It was created on the simple premise that if a manufacturing facility sees fit to regularly maintain its mechanical resources (its manufacturing, processing, packaging, and other machines), then it might be willing to commit itself to maintaining its much more valuable human resources. The goal is the same: maintain valuable resources in order to extend useful life, increase productivity, and reduce downtime. This rudimentary understanding has evolved into the EMC of today. The philosophy and structure of the EMC is represented by the BEAA+ symbol.

The BEEA+ symbol (see Exhibit 7) is a visual reminder to all parties — plant management, EMC staff, plant safety departments, the facility's occupational health department, plant training and education departments, and employees — that specific skills and capabilities need to be developed in four clearly defined areas and that proactive cooperation is required of all parties in order to accomplish meaningful injury reduction.
**What the Symbol Represents**

**Biophysics**

Biophysics refers to the physical capabilities of the employee. Using specially designed machines and equipment, it is possible to measure an employee’s physical capabilities on a muscle group by muscle group basis. This is especially important in an effort to identify high-risk joints in individual employees. Only by creating a baseline capability database for each employee is it possible to measure improvement throughout a program’s term. This is a significant departure from a safety program that focuses on machinery and environmental issues. Because microtrauma and repetitive stress injuries occur to individual employees, oftentimes irrespective of the implementation of traditional environmental safety procedures, new remedial programs must be developed based on the needs of individual employees. Biophysical measurement enables that process. The ability to measure, monitor, and report is especially important as one considers the prevalence of injury among an aging work force.

**Ergonomics**

Understanding the workplace environment is equally important. Tools,
machinery, working angles, and the nature of products and materials that are handled all contribute to potential stresses on workers, many of which may result in eventual microtrauma or repetitive stress injury. A thorough understanding of biomechanics is necessary in order to identify areas of ergonomic risk. In addition, that same understanding is required to provide constructive input on ways to make necessary alterations and accommodations to protect workers without sacrificing production.

**Education**

Education refers to transferring the specific knowledge required to do a particular job task in a safe manner. For example, one job task may require lifting a 20-pound weight from a position where a worker’s arms are extended 12 inches. It will be important in such an environment for workers to understand precisely how to lift such a weight correctly and to also understand the possible shoulder damage that can occur from the use of an incorrect lifting technique. Education must occur on an individual basis, as workers are each unique. Observing the manufacturing floor in many American factories will quickly convince one that a cookie-cutter approach to job task education simply won’t work for everybody involved. A 6-foot, 200 pound, 27-year-old male may not have any difficulty lifting the 20-pound weight referenced above. But a 5-foot, 4-inch, 120 pound, 59-year-old woman with early stage osteoporosis may cause lasting shoulder or spinal damage if she attempts the procedure incorrectly.

**Awareness**

Awareness is an effort to identify and highlight known areas of risk by reaching out to the employee with specific information. Awareness can be accomplished through training classes or even by posting notices in risk areas. For example, a poster identifying a specific task area as a high-risk area for back injury will help to remind workers to use proper lifting techniques, thereby reducing potential overexertion injuries. Awareness is also accomplished by defining the limits of individual workers and helping them become aware of their limitations and how those limitations impact the areas of biophysics, ergonomics, and education. A critically important aspect of awareness revolves around symptom recognition. Although not all injuries are preceded by pain indicators, pain is often a symptom of an impending problem of more serious magnitude. Employees need to be made aware that pain may be an indicator of a problem that needs to be addressed, not stoically ignored. While there may be a culture of “toughing it out” in some facilities, there is an increasing awareness of the potential costs associated with unattended pain. A focused
awareness program will go far to help all employees understand the economic benefits of prevention, as opposed to the costly treatment alternative.

All Together Now

All four areas must work in concert. If an injury occurs, it will be because of a breakdown in one or more of these four areas.

Understanding the physical requirements of a specific job task may force creative thinking in order for the ergonomics team to accommodate the physical realities of some employees. This implies, of course, that different departments within the company will need to communicate as never before. The ergonomic team will be brought into more conversations as the physical requirements of specific job tasks are better understood. The safety department will need to become more closely engaged with the training department to determine how best to educate employees on a variety of work-related issues. Employees will need to take more responsibility for their own safety and well-being by proactively increasing their strength and flexibility as required to meet minimum job task thresholds. EMC staff will need to conduct biophysical testing and measurements to provide the knowledge needed to make changes, either in the manufacturing environment (ergonomics), in training (education), or on the part of the employees themselves (awareness). Management will need to be the “glue” to keep the entire effort working in a cohesive manner.

The BEEA+ approach requires the active cooperation of plant management, safety, occupational health, training, ergonomics, workers, and the EMC staff to bring about the awareness and changes necessary to prevent microtrauma and repetitive stress injuries. The BEEA+ approach helps to bring management and employees to a solution where all parties can see and understand the benefits of working together toward common and important goals.

A Pilot Project Is Launched

The goal of the BEEA+ approach is to create a cost-effective solution to the problem of musculoskeletal injuries in the workplace, and particularly those injuries resulting from microtrauma and repetition. In 2005, InjuryFree launched a pilot program with Kimberly-Clark’s Conway manufacturing facility.

Kimberly-Clark (K-C) is a Fortune 200 corporation with 41 manufacturing facilities in North America. K-C is often considered a leader in manufacturing innovation and the implementation of safety best practices. Yet K-C’s Conway feminine care products plant was experiencing significant workers compensation claims, in spite of the aggressive safety programs, procedures,
and practices that had been instituted over many years. In this plant of approximately 480 employees, many of the reported injuries were due to microtrauma and repetitive stress, involving backs, necks, and shoulders. These losses were deemed unacceptable to plant management, as well as the plant’s safety and occupational health departments. Moreover, injuries were having a negative effect on employee morale.

Injuries at the Conway plant varied from year to year (Exhibit 8). These injuries translated into an average medical cost of $140,000 per year.

Plant management took the step of instituting an EMC pilot program to reduce musculoskeletal injuries, especially those due to microtrauma and repetitive stress. A one-year pilot program was created to test the theories and methodologies. Together, InjuryFree and K-C Conway agreed to design and build an in-plant presence — an Employee Maintenance Center (EMC). Plant management allocated approximately 800 square feet of space in a high-traffic area between the factory floor and the break room/restrooms area of the facility. This central location enabled virtually any plant employee to reach the EMC from their particular work area within five minutes or less. Ready access was deemed of critical importance so that employees could make use of EMC services and still have break time available for personal use. Because EMC services are highly customized to each employee, visits are very short. In addition, keeping the facility open

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**Exhibit 8**

**Medical Cost of Injuries – Kimberly-Clark, Conway**

<table>
<thead>
<tr>
<th>Year</th>
<th>Microtrauma</th>
<th>Macrotrauma</th>
<th>Total Medical Cost</th>
<th>Avg. Medical Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td></td>
<td></td>
<td>$150,000</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td></td>
<td></td>
<td>$200,000</td>
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<td></td>
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<td>2000</td>
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<td></td>
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<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
during evening work shifts provided access to services that would be highly unusual in any other setting.

Plant management encouraged workers to take full advantage of EMC services, whether before or after work shifts or during breaks. Proximity to employees proved to be a key factor in high utilization of EMC services. Because of the flat fee structure, there was no cost to employees to use EMC services. This, too, is believed to have played a role in high utilization rates.

Beginning in January 2005, the EMC enrolled and served its first 143 employee/participants. Demand for EMC services was immediate and utilization was strong. This was due to the large number of employees who were experiencing pain and discomfort as a result of work-related activities and nonwork-related activities. Agreement was reached early in the facilitation process that the EMC would address nonwork-related pain and discomfort, as those issues could be further exacerbated at work. As word spread around the factory floor, participation levels increased as more employees decided to investigate the EMC and the services available there.

The EMC was organized under the supervision of the Kimberly-Clark safety department. The EMC’s director was invited to participate in safety department meetings and became a veritable co-worker with members of the safety department as well as the occupational nursing staff. This high level of cooperation and communication plays an important role in the success of the EMC program. A corporate “champion” is a necessary component in the successful deployment of an EMC.

Matching Physical Capabilities With Job Tasks

Because microtrauma and repetitive stress injuries affect particular joints and muscle groups, a significant part of the EMC strategy is to understand the physical requirements of each job and the particular tasks those jobs entail. Once a minimum performance level is established, it is possible to compare a worker’s physical capabilities to the requirements of the job task in which he or she is engaged. When strength and flexibility deficiencies are identified, a specific strengthening or flexibility regimen can be developed to assist the employee in achieving a higher level of performance. When a higher level of employee performance is achieved, injury can be prevented.

Of critical importance to the success of this strategy is a willingness on the part of the employer to allow EMC staff to become intimately acquainted with the factory floor, its employees, work processes, and job tasks.

This approach to injury prevention makes the EMC concept a truly
customized program. The program is not only customized for each employee who seeks service; the program is customized for each employee’s specific joints and muscle groups.

**How the BEEA+ Philosophy Works in Real-Life Settings**

One of the keys to the success of the injury reduction initiative at the Conway facility is excellent communication between plant management and safety, occupational health, and EMC staff. As awareness programs rolled out, workers became more aware of the interaction between their physical capabilities and the ergonomic realities of the factory floor. In one instance, a worker came to the EMC complaining of shoulder pain that was atypical. During the course of conversation with EMC staff, it was learned that the worker was having a more difficult time than usual opening the flaps on boxes that came down the manufacturing line. The EMC director shared that information with safety and ergonomics personnel, and they in turn investigated the boxes on the line. It was soon discovered that the adhesive used to glue the box flaps was stronger than usual, which required more stress to open the flaps. The increased stress requirement exceeded the worker’s physical ability to open the box without overstressing her musculature, which resulted in pain. The safety team was able to identify the problem and communicate it to the manufacturing team so the neces-

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**Exhibit 9**

**EMC Enrollment Levels — Kimberly-Clark, Conway**

![Graph showing EMC enrollment levels from January 2005 to December 2008.](image)
sary changes could be made quickly, preventing injury to this worker and possibly others. In the meantime, the affected worker was able to avoid prolonged overstressing and additional microtrauma. Had the EMC not been in place, it is entirely possible that an injury may have occurred and a claim may have been filed.

**RESULTS**

Participation continued to increase throughout the first year (see Exhibit 9) and eventually the EMC served 297 employees, or 62 percent of K-C Conway employees by the end of the first year. Reductions in injury rates were also seen during the first year.

The second year of EMC operations saw increased participation on the part of K-C employees. About 56 percent of the plant’s employees had utilized EMC services during the second year (Exhibit 9). A total of 70 percent of K-C employees had utilized EMC services one or more times over the course of the two years of EMC operation. More significantly, the second year saw an even greater drop in injuries and resultant costs (Exhibit 10).

**Exhibit 10**

**Medical Costs of Injuries — Kimberly-Clark, Conway**

<table>
<thead>
<tr>
<th>Year</th>
<th>Microtrauma</th>
<th>Macrotrauma</th>
<th>Total Medical Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td>$400,000</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td>$350,000</td>
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<tr>
<td>2006</td>
<td></td>
<td></td>
<td>$300,000</td>
</tr>
<tr>
<td>2007</td>
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<td></td>
<td>$250,000</td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td>$200,000</td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td>$150,000</td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td>$100,000</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td>$50,000</td>
</tr>
</tbody>
</table>

Note: All microtrauma claims in 2006 and 2007 are closed. No additional workers compensation expenses for microtraumas will be charged to those years.
By the end of the third year, 64 percent of the plant’s employees had utilized EMC services at least once that year, and fully 88 percent had used the EMC at least once during the three-year span. This utilization is a departure from the typical wellness model, where participation rates often start modestly and decline from there. Exhibit 9 shows the continued decline in injury rates.

The data appear to support the hypothesis that an integrated program that incorporates biophysics, ergonomics, education, and awareness, coupled with high employee participation levels, has a demonstrated effect of reduced injury rates, particularly those injuries caused by microtrauma or repetitive stress. In addition, there appear to be cost savings commensurate with reductions in injury rates.

Preliminary results at other EMC implementations show similar results.

**Note:** At the time of this writing, Kimberly-Clark’s Conway plant continued to show improvement in injury rates. The plant has not experienced an injury for over 180 days — a record for the facility.

**Observations**

1. To accomplish significant improvements in injury rates, significant changes need to be made in the way injury prevention is approached. Implementing more of the same generic safety training doesn’t get to the job task and muscle group level, which is where improvements in rates of microtrauma and repetitive stress injuries can occur. It is reasonable to conclude that an EMC-like implementation using a BEEA+ strategy is the missing piece.

2. Improvements in injury rates can be accomplished by focusing on overexertion and repetitive stress. Because these types of injuries have inherently longer recovery times compared to macrotrauma injuries, the payback for each injury avoided is dramatic. For example, the hard cost to treat a typical carpal tunnel case using typical treatment methodologies is $17,971.12 Avoiding that injury saves not only the hard costs, but the lost worker time and productivity as well.

3. An EMC can’t accomplish outstanding results in isolation. The evident success of the Conway implementation is due in no small part to outstanding cooperation on the part of all members of the team: plant management, safety, occupational health, and ergonomics. The role of the EMC is to facilitate and coordinate the BEEA+ philosophy.
4. An EMC will open up a new pipeline of communication between employees and management. Because of the relationships that develop between EMC staff and plant employees, EMC staff has the opportunity to learn quickly about the high-risk zones of a plant, its processes, its machinery, and job tasks. This translates into opportunities for improvements which relate directly to reductions in injuries, money saved, and enhanced employee satisfaction.

5. Changing a culture and an entire approach to injury prevention takes time and patience. Dramatic changes like this require “buy-in” from a variety of constituencies, and that often requires time. Especially important is acceptance from the employees themselves, and developing trust is not automatic, simple, or fast.

**Conclusion**

After implementation of an EMC at the Kimberly-Clark Conway plant, utilization of EMC services correlated with a reduction in musculoskeletal injuries. This reduction in injuries resulted in savings in workers compensation and related expenses. The three-year Conway EMC implementation provides data that proves the efficacy of the BEEA+ strategy for injury prevention. Implementing the BEEA+ strategy is a novel, multimodal approach to solving a problem that is plaguing American industry and America’s workers.

The opportunity now exists for other manufacturing companies to obtain similar results using the BEEA+ strategy and EMC solution. The BEEA+ strategy brings opportunities to key departments in the manufacturing facility. Safety has an opportunity to add biophysical/biometric components to their programs, a piece of the puzzle that has been overlooked. Programs can now be developed that address risks due to physical variations between individual workers. Occupational health nursing has new tools with which to mitigate employee risk and injury and to more effectively assist workers in identifying microtrauma precursors to chronic injury. Ergonomics has new opportunities to coordinate prevention programs that are more easily and precisely quantified. Plant management, finance and corporate executives have the opportunity to champion a solution that delivers positive results for the company and the worker. The EMC solution, implementing the BEEA+ strategy, provides an opportunity for any large manufacturer to prevent injuries due to microtrauma, reduce costly workers compensation and related expenses, increase productivity, and enhance worker satisfaction.
ENDNOTES

4. Ibid.
5. Ibid.
8. Extrapolation of data from National Safety Council and Bureau of Labor Statistics in Exhibits 1 and 2, respectively.
11. Ibid.

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InjuryFree, Inc., is a leading developer of injury prevention strategies for industry. The company’s solutions are delivered on-site and online. Employee Maintenance Centers (EMC) are on-site rehabilitation and injury prevention centers installed in manufacturing facilities. EMCs dramatically reduce injuries and related costs. InjuryFree’s second business unit, ErgoStat, is a Web-based software solution that simplifies management of risk, safety, and ergonomic issues in the workplace and assures compliance with HIPAA and regulatory agencies.