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OCCUPATIONAL HEALTH CONSULTANTS**

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Occupational Chiropractic & Applied Ergonomics Newsletter

THE USE OF THE BIOMECHANICAL STRESS INDEX IN POST-OFFER, PRE-PLACEMENT SCREENING OF FACTORY WORKERS: THE IMPACT ON THE BACK INJURY RATE.

By Don Brown, DC, DACBOH

(This article is an edited and condensed version of a paper submitted by the author to meet the project-research requirements of the Diplomat program for the American Chiropractic Board of Occupational Health.)

Introduction and Background

Worker selection by post-offer, pre-placement physical screening has been shown to be effective in identifying work candidates and employees at high risk to low back injury. The Biomechanical Stress Index (BSI), developed by Joseph Sweere, DC, DABCO, DACBOH, FICC, is a chiropractic model for post-offer, pre-placement screening for spinal instability, noted here to have a positive effect on the incidence of workplace low back injury and lost workdays. Its strength is derived through a composite of common deviations from the biomechanical normal rather than utilization of any single factor.

The BSI was first utilized as the instrument used in a five-year project in a labor-intensive glass-fabricating facility. Screened workers who were determined to be high-risk were either not hired or assigned to lower risk workstations. Back injuries in unscreened –vs- screened workers occurred at a rate of 5 to 1 respectively. The lost workday rate per worker was 27 times greater in the unscreened population.

This study reports the impact of the BSI used to screen new employees in a foam-fabricating facility on the incidence of back injury and lost work days. In this case, however, the employer could not accommodate high-risk workers in the production areas. Therefore, if the examination revealed that the job candidate was determined physically unacceptable for the physical work demands for performing the job, the job offer was withdrawn. This required that the physical screening had to meet the standards of the Americans with Disabilities Act (ADA). Under ADA terms, employees had to be a direct threat to the health of themselves or co-workers to be determined as physically unfit and disqualified for the job. Could the BSI still be effective in significant injury reduction when used to screen out only those employees who show such im-minent risk that they meet the criteria of the Americans with Disabilities Act?

Methods

To answer this question, work related injury data was collected from the company OSHA logs for the current study period and for the previous two years. The number of back injuries and lost workdays (LWD) due to back injury were tabulated and compared between screened and unscreened workers. LWD included either days away from work, days of restricted work activity or both.

(continued on next page)

(from pg. 1)

New employees hired into production positions were sent to the chiropractic office for a physical examination. A thorough general health and neuro-musculoskeletal history, physical examination and lower spinal x-ray studies followed the BSI protocol. The findings of an examination were scored by the scoring system unique to the BSI, using weighted values to determine various factors predisposing the candidate to work injury. This method applies weighted values to various predisposing factors. For example, if an employee has a transitional vertebra at the lumbosacral junction this may put this person at increased risk for lower spinal instability. However, if this condition is accompanied by notable anatomical limb length deficiency, the presence of both may result in the individual being at greater risk. With the presence of degenerative disc disease, tenderness to palpation and a history of previous low back injury, the accumulated score could classify this person as very high risk of lower spinal injury in a physically demanding job.

The findings listed in the above example would accumulate a minimum of 40 points. Depending on the characteristics of the findings, more risk could be assigned. A relative risk was then assigned according to the cumulative score. A cumulative score of greater than 40 points was considered very high risk so the candidate was not recommended for this job. The employer was then notified regarding the outcomes of the examination. Extensive effort was made to ensure that the examination was related to the hiring procedures as outlined in the guidelines of the National Institute for Occupational Safety and Health (NIOSH) and the Americans with Disabilities Act (ADA). In order to test the reliability of the BSI to reduce the incidence of back injury, the injury rates and lost workdays of new (screened) and previously hired (unscreened) employees were tracked over an 18-month period.

Results

During an 11-month period of hiring, 77 employee candidates were screened and were employed by the company. Five others did not report to their first day of work. Two were determined not physically fit for the job and job offers were withdrawn. After 18 months of data collection, there were 25 screened workers who were employed for at least 6 months in a production workforce of 80 workers.

During the screening period there were 11 back injuries in unscreened workers that included LWD, however, among the screened group of workers there was only one back injury with associated LWD. The screened worker who was injured was actually classified as a very high risk. The decision was made, however, that this worker could meet the physical demands of the job if a period of two weeks of modified work would be allowed for physical acclimation to the job. This was the

only very high risk worker that was hired. The subsequent injury occurred 7 weeks after hire.

The incidence rate of LWD (per employee) due to back injury in screened workers was 1.3 while in unscreened workers it was 16.7. This is statistically significant with an odds ratio of 0.07 and a confidence interval of (0.00, 0.52). In the 3 consecutive years of data collection, LWD due to back injury among unscreened workers ranged from 0 to 67 with an average being 19. The one injured, screened worker required a total of 19 LWD.

During the two previous years (1998, 1999) and the first year of BSI screening (2000), the single most common time period for back injury to occur was in the first six months on the job (FIGURE 1). The incidence rate of back injuries per employee in the first 6 months of employment was greater amongst unscreened workers (0.021) than in screened workers (0.013).

Of the workers who were employed for over six months, there were no back injuries among the 25 screened workers (TABLE 1). The average length of employment in this group at the time of data collection was 10 months. The numbers of injuries in unscreened workers employed for over six months were greater for each of the three consecutive years; 4, 4 and 8 respectively. The average length of employment at the time of these back injuries was 25 months. There is a statistically significant difference in incidence between the two populations by Fisher Exact test ($p < .05$).

Those employees who scored on the BSI in a range of low risk to moderately high risk (up to 30 cumulative points) were not injured. This results in a negative predictive value of 1.0. This means that there is a good probability that those who are determined to be at low risk to moderately high risk will not be injured.

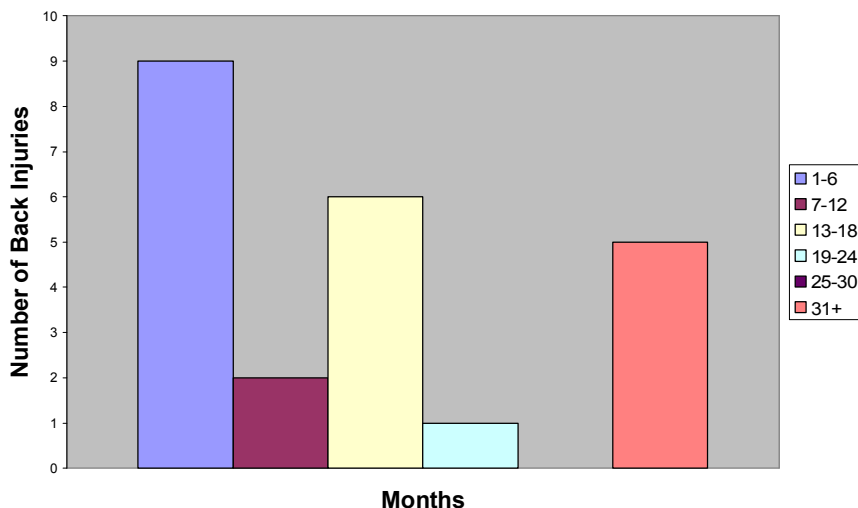
BACK INJURIES AFTER 6 MONTHS OF EMPLOYMENT				
TABLE 1	1998	1999	2000 screened	2000 not screened
# of Workers	80	80	25	57
Back Injuries	4	4	0	8
Lost Work Days	36	60	0	234

Discussion and Conclusion

FIGURE 1 (pg. 3) suggests that back injuries occur most commonly within six months after hire. It is controversial whether inexperience on the job is the reason for this increase in risk of back injury. Though it is generally believed that age is considered a potential risk factor, (next page please)

it has also been shown that older workers who have not yet experienced low back pain are less likely to develop low back pain. The age range of the screened employees was from 18 to 64.

Figure 1: Length of Employment When Injured



Did the screening make a significant impact on the injury rate? Only two employees were not hired as a result of the screening. The study design and population size is limited but does suggest that the BSI is a valuable tool for employers to consider. The reduction in LWD and low incidence of injury among the screened group are statistically significant in workers over a six month period.

From a fiscal point of view, *given that the average low back injury is expensive in medical costs (\$10,450) and more expensive when disabling (\$28,000), the reduction of even one back injury per year in this small population would have a significant impact. This employer's workers' compensation insurer reported that a savings in medical expenses of \$60,000 had occurred compared to the year prior to instituting the BSI. During the study period the employer switched workers compensation insurance carriers. The company also implemented a wellness program which allowed workers to have regular access to chiropractic care. These are confounding factors, which may have impacted the incidence and reporting of back injury but not the difference between the screened and unscreened populations.

At the end of each examination the employee would have the opportunity to question the examination results and view the spinal x-rays. The significance of any positive finding was explained. If it were evident there was a possibility that the final examination score might not be favorable the employee would be informed of the reasons why. Invariably, new hires expressed gratitude for learning about their personal health information.

The employer reported that five employees did not report for their first day of work. At least one of these employees was at moderate risk and cautioned about the effect the job could have on their current health status. The incidence of employees not reporting to the first day of work did happen occasionally prior to using the BSI screening protocols. However, it is conceivable that employees may eliminate themselves from employment in a high risk job when educated about their health status.

Even though the BSI gives the doctor the benefit of objective scoring, considerable flexibility is needed by the doctor to make the final determination of fitness. Based on the physical demands of the work stations of this particular facility and the risk scale determined by the BSI protocol, a threshold value was set as a guideline for determining a high risk individual. Eleven of the 77 employees screened were actually considered as moderately high risk for back injury by the strict scoring of the BSI. In each of these cases, the final pass/fail status could also be based on information that could not be easily scored, (e.g. injury history in a previous similar job), an active lifestyle or not, presence or absence of symptoms, or positive provocative tests.

It is concluded that the BSI post-offer, pre-placement physical screening procedure is an effective one for injury and LWD reduction even when screening out only those at highest risk. □

Author's note: Now, six years following the initiation of this program, this employer continues to use the BSI for screening candidates for hire based on a job offer. Changes in management and hiring practices year to year are challenges for keeping the service accountable and responsive to the employer's needs. However, the total back injuries have remained lower than pre-2000 levels.

** This data is from the Injury Facts 2001, published by the Bureau of Labor & Statistics.*

About the author: Don Brown, DC, practices in New Richmond, WI. A graduate of Northwestern College of Chiropractic, he has also completed the 360 hour postgraduate specialty coursework for chiropractic occupational health and has been awarded Diplomate status in the American Chiropractic Board on Occupational Health (DACBOH). He may be reached at 714-246-2110 or dgbrown@pressenter.com.

CONFIRMATION ALCOHOL TESTING: BREATH ALCOHOL TECHNICIAN (BAT) Training & Proficiency Now Available

In the past several years, the IACOHC has offered (and continues to do so) the training for becoming qualified to perform Department of Transportation (DOT) testing – both for the drug testing and for the **initial non-evidential alcohol screening** processes.

Consequently, what has happened is that DCs have been able to set up their clinical practices as ‘onbe-stop-shops’ for employers required to test workers under the regulations and requirements of the DOT. Along with drug and alcohol screening, most DCs also offer DOT physical examinations as a service.

Business has been excellent for many DCs, so much so the IACOHC is frequently asked this question:

“Some time ago I completed the training and proficiency requirements to perform DOT alcohol (initial) non-evidential screening. I also perform DOT drug testing and the physical exams. My practice has grown so that now employers are asking if they can get confirmation alcohol testing through my clinic. **I am not a Breath Alcohol Technician (BAT) qualified to perform confirmation alcohol testing but would like to become a BAT?**”

The IACOHC’s answer: Yes, we are hearing a good deal of this now from those who initially completed the training and proficiency to become a Screening Test Technician (STT) for performing non-evidential DOT alcohol screening. (The DOT business has been excellent for so many DCs.) **The IACOHC now offers the Breath Alcohol Technician (BAT) training and proficiency course.**

This is offered as a single day seminar and also as a program for groups of DCs. Keep in mind that your office staff may also equally become trained and therefore qualified for performing this service. For full information or registration contact Elizabeth by email at eauppl@charterinternet.com or call 507-455-1025.

DOT Specimen Collector training is available as well. DOT Specimen Collectors, having met federal guidelines for training and demonstration of proficiency, **perform DOT drug testing by urine specimen collection.**

DOT Screening Test Technician (STT) training is available too. DOT Screening Test Technicians, having met federal guidelines for training and demonstration of

proficiency, **perform DOT non-evidential, initial, alcohol screenings.**

DOT Breath Alcohol Technicians (BAT), having met the federal guidelines for training and demonstration of proficiency, **perform DOT (evidential) confirmation alcohol tests.** BATs use sophisticated, federally approved, equipment for performing tests and printing results of tests. Generally, this equipment purchased new can run about \$2500. While the IACOHC is not necessarily suggesting this, we have found that many BATs have located used equipment online or elsewhere for very reasonable costs.

PHASE 2 – DIPLOMATE PROGRAM: CHIROPRACTIC OCCUPATIONAL HEALTH & APPLIED ERGONOMICS – Continues:

(For full schedule to include sessions already completed and soon to be available on DVD as distance learning, please contact Northwestern Health Sciences University, below)

January 6-7, 2007: Mr. Brian Halliday

“Accident and Injury Prevention - Worksite Hazards Analysis”

February 10-11: Rosie Ward Ph.D.: “Workplace Wellness”

March 10-11, 2007: Elizabeth L. Auppl; Dawn Soleta; Steve Hollander; Joseph J. Sweere, DC, DACBOH
“Returning the Injured Worker to the Workplace” (titles per individual speaker vary)

April 14-15, 2007: David Gilkey, DC, DACBOH; Joseph Sweere, DC, DACBOH; Michael Bawek, DC
“Preliminary Field Study Reports for Class Participants Interested in the DACBOH Certification”

May 5-6, 2007: Steven Baer, DC, DACBOH
“Forensic Considerations in Occupational Health and the Functional Capacities Evaluation”

June 2-3, 2007: Dr. Stacy Thornhill
“Physical Rehabilitation of the Injured Worker”

July 7-8, 2007: Scott Bautch, DC, DACBOH
“Identifying and Responding to Employers’ Needs”

Contact Northwestern Health Sciences University at 952-888-4777, ext. 249 to learn more or visit the web site at <http://www.nwhealth.edu>. **Phase 1 distance learning is available, see order form next page.**



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Session 1: The Role of Chiropractic in Occupational Health Current statistics show that most of the injuries that occur on the job involve the neuromusculoskeletal system. Who knows how to prevent and treat these conditions better than anyone else? You, the chiropractor. Find out how you can translate your chiropractic skills into prevention and improved clinical case management of work and non-work related disorders. Discover how corporations are rapidly expanding a more conservative, prevention-driven approach to workplace health and wellness. **Joseph J. Sweere, DC, DABCO, DACBOH, FICC**

Session 2: Learn How to Promote Services with an Emphasis on Industrial Relations Discover what it takes to create profitable relationships with business and corporate employers. Real-world examples and proven techniques will be explored. **Scott Bautch, DC, DACBOH**

Session 3: DOT Drug Testing and Alcohol Screening Certification and DOT Physical Exams. You will become certified for official recognition to perform U.S. Department of Transportation screenings for your industrial clients and the general public. Discover how quickly and easily you and your staff can add this service to your practice and how by providing one of these services opens the doors for providing a host of services to industrial clients. **Elizabeth L. Auppl, CDSP/T, CASP/T; and Joseph J. Sweere, DC, DABCO, DACBOH, FICC**

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*Other 7 sessions of year one will be available on DVD soon!
Check with your state licensing board(s) for approval of distance learning toward license renewal credits. The DVD format is approved by the ACBOH so you can earn hours toward the diplomate.

RECREATIONAL BOATING SAFETY: IS THE PUBLIC AT RISK?

by Elizabeth L. Auppl

Ah, summer! Be gone winter! Before we know it winter cold and ice will be but a memory. Boats and other watercraft devices will come out of storage and hit the waters for sun in the sun. But how safe is the public when it comes to boating? Is it time for every state to implement laws intended to prevent injuries and fatalities? Especially for children, and especially for others on a body of water that are not boating but enjoying summer fun?

We've seen the crack-down on getting drunken boat operators off the waters which in turn generated a level of comfort for the boaters who respect safety on the waters. Where waters (lakes and rivers) comprise significant geographical territory for a county, a boat patrol fulfills statutory duties of a sheriff's department for public and private water safety and law enforcement. Law enforcement presence is important to locating boaters in distress, performing search and rescue mission, and looking for boaters operating a boat while under the influence of alcohol.

Safety classes are usually offered (often supported or supplemented by a local DNR agency) for learning rules and regulations of the waterway, the proper equipment needed for safe boating, emergency procedures, registration requirements, parental responsibilities and many other aspects important to safety of self and the public including driving lessons.

For more information, a quick call to your state's Department of Natural Resources or the local law enforcement/sheriff's department should provide you with everything you need to know and a schedule for training.

Some counties have implemented programs for citizen safety on waters; one such county is Coconino (AZ) where T-shirts were given to children in boats that read "I got caught wearing my life jacket". This program educates the young about personal safety and puts a bit of pressure on parents to provide PFDs for kids.

Unfortunately, drivers of recreational boats are not yet required to demonstrate

understanding of even basic boating rules before hitting the waters. The United States Coast Guard reports that there were 697 persons died in 2005 in recreational boat accidents, 474 of whom drowned. Of the 474 drowning victims, 412 were not wearing personal flotation devices (PFDs). The previous year, 676 persons died. (These figures do not include data surrounding injuries or deaths by use of personal watercraft (PWC). The USCG indicates that private owners of PWCs are safer than those renting PWCs and of those renting, most were not required by the renting agency or person to demonstrate proficiency of use or have knowledge of any safety regarding use.)

Many states have enacted legislation toward establishing requirements for minimal safety standards, most states are still in that process.

Requirements for the use of PFDs by children vary greatly per state, many states having mandatory laws concerning children under age 12; yet, some states have no laws; and one state has law mandating use by children under age 12 but only on federal or state owned waters. Sixteen states have no laws in place concerning 'pre-rental instructions for PWC operators'. Thirteen states have no laws requiring boat operators to possess even basic understanding of boating safety.

Considering the serious results of boating accidents – drowning, fire, injury or death of swimmers and skiers, injury or death of passengers in boats, propelled persons from boating accidents or from just badly driven boats – is it time for states to pass legislation requiring even the most basic knowledge and abilities of recreational boat operators? Some states have stricter bicycle laws then they have recreational boat operator laws much less laws protecting our children by required use of PFDs.

Laws are meant to protect property and save lives. While we may exercise the freedom to own recreational boats or watercraft, does that freedom release one from acting responsibly if not for the sake of self then for the sake of the public? If each person were to contact their state's DNR agency or their local law enforcement/sheriff's department to inquire about safety tips and requirements surrounding operating boats – it would seem that the number of fatalities could easily be reduced significantly, and that injuries could be drastically reduced and in large, be prevented.