

Final Report NIOSH grant number 5R180H03619
Prevention of Upper Extremity Cumulative Trauma Disorders
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List of Abbreviations

UECTD upper extremity cumulative trauma disorder
WC Workers' Compensation
ADL Activities of daily living scale
CATI computerized telephone interview
CES-D Center for Epidemiologic Studies -depression scale

ABSTRACT

The purpose was to determine whether a simple, inexpensive educational intervention packet sent to claimants, employers and physicians would reduce subsequent workers compensation claims for UECTDS, improve function for injured workers, and increase claimant use of vocational rehabilitation.

We delivered the packets to 220 employers randomly selected from the 436 receiving Maryland Workers Compensation claims for UECTDs between mid February and December 2002. A similar packet was sent to 326 workers filing claims against those 220 intervention employers during that same period. Their physicians also received packets. Three hundred twenty six claimants were in the control group, having filed claims against one of the 216 control employers.

The packet contained information on how to reduce common UECTD injuries, UECTD prevention strategies among employers, physicians and claimants, resource lists, and information on vocational rehabilitation, workers compensation and physician forms to guide history taking.

We inspected subsequent claims filed from mid Feb. 2003 through Dec. 2003. There was no difference the in number of subsequent claims for intervention compared to control employers.

We surveyed 31% of claimants on average 8.8 months after the claim, and 27%, 14.5 months after the claim. We also surveyed 19% in a 3rd interview, not yet analyzed. Surveys collected information on capacity to perform ADLs, mood, use of vocational rehabilitation, and functioning at work and home.

Neither claimant ADL scores nor use of vocational rehabilitation differed by intervention status.

The intervention did appear to have an affect on job structure and retention. An average of 8.8 months after the claim, intervention claimants were less likely to have left their job due to their injury and less likely to have been fired or laid off. Evidence suggests that benefits to the intervention claimants are likely to have been due to their own efforts. By 14.2 months on average, those intervention claimants who had reviewed the educational material were less likely to be doing the same job at work, but marginally more likely to be working for the same employer than controls.

Intervention claimants functioned better at home and recreation than controls an average of 14.5 months after the claim. Those who had reviewed the materials were also sleeping better, and marginally less depressed.

Just over half the responding intervention claimants reported looking over the packet. The video proved a less effective technique for reaching claimants. Only 14% of claimant respondents viewed a video.

Claimants reported receiving information on Workers Compensation mainly from Lawyers. Less than 25% received information from employers. Very few (7%) sought information on the Internet, and less than half from print sources

HIGHLIGHTS/SIGNIFICANT FINDINGS

Employers

Maryland employers (N=436) receiving UECTD claims from February through December 2002 were randomized to receive an educational intervention: a packet including sections on basic ergonomics, techniques for setting up safe workstations, ergonomics committees, ergonomics success stories and vocational rehabilitation. Also included was a video highlighting interactions among injured workers, employers and physicians. It was designed to improve workplace ergonomics through cooperation among all three. The packet also included an offer of a free ergonomics walk-through conducted by a certified ergonomist.

Those who received the intervention did not experience fewer claims than employers randomized to the control group during the same 9.5-month period a year later.

Claimants

UECTD claimants filing the claims identified in the initial period were also designated intervention or control based on their employers' randomization. Claimants were invited to participate in 3 interviews, and agreeers gave consent in accord with and under the supervision of the IRB. Those who worked for intervention employers received the educational packet and video, as did their physicians.

Just over half the intervention claimants reported reviewing the packet. Few (14%) viewed the video designed to promote communication among claimants, employers and physicians, promoting ergonomically safe workplaces and healthier workers.

Results from the first interview showed that claimants who received the intervention were less likely to leave their jobs because of the UECTD, and less likely to be fired or laid off from that job. By the second survey, averaging 14.5 months after the claim, intervention claimants were less hampered in their household and recreational activities than control claimants.

Second survey claimants who had reviewed the educational packet were less likely to be doing the same job, and marginally more likely to be working for the same employer than others. Intervention claimants were also sleeping better, and functioning better in household and recreational activities. Their depression scores were marginally better, on average, than control claimants.

These benefits to workers could have come from employer response to the intervention, or from their worker responses to the intervention.

Claimants received information on Workers Compensation mainly from Lawyers. Less than 25% received information from employers; the preferred source named by advisory-group claimants. The preferred time for acquisition of basic information on workers' compensation was at the time of hire. Very few (7%) sought information on the Internet, and less than half from print sources.

Claimant ADL scores in the year or so (average 8.8 months) after the claim indicated that respondents were still having difficulty (midway between “no difficulty” and “can do but with difficulty” in performing tasks requiring use of their hands. ADLs but did not differ by intervention status, nor did they differ in during the subsequent survey conducted on average 14.5 months after the claim.

Claimants in the intervention group were not more likely to use vocational rehabilitation, occupational or physical therapy than those in the control group, in either survey.

TRANSLATION OF FINDINGS

How do these results inform a) UECTD prevention efforts, b) methods of reaching employers and claimants with prevention educational materials c) and future analysis plans?

Should the intervention be scaled up?

As delivered, and in the time period delivered and later measured, the intervention had no impact on the number of subsequent claims. So, from this evidence, we cannot recommend that the inexpensive packet be sent in hopes of preventing future injuries to other workers.

However, there is some evidence that the materials generated activities granting some protection to injured workers from injury-driven-job loss, and promote adjustment following the claim. They appear to hold on to their jobs more than controls, and ultimately these jobs appear to have a slightly different character. It is possible that, armed with information, intervention claimants are able negotiate their tasks and environment work a little better with their employers and co-workers. On the other hand, having been alerted by the intervention materials, employers may have initiated or have been more receptive to changes suggested by claimants. These intervention claimants also report being better at handling tasks at home, and there is a trend towards their having better emotional status.

Since this intervention is simple and relatively inexpensive, an educational intervention sent to probable UECTD claimants from should benefit workers, and may empower them to improve their lives. This is a cautious recommendation. From out 30% response rate we cannot generalize to all Maryland UECTD claimants. However, with the conservative conclusion that it only applies to one third of claimants, a substantial number of adverse events (firings) could be prevented with the use of a very simple and inexpensive set of educational materials. For our (Occupational Health Program we will maintain the website containing these materials, in expectation that more and more claimants will have Internet access in the future.

Reaching employers with the intervention

We have no way to determine how many employers reviewed the material. While the design included no systematic method of surveying employers to determine whether they had reviewed the materials, we communicated informally with some of them. By and large they were difficult to reach. Large employers appeared less receptive to the intervention. Often they had entrenched programs regarding UECTDs, and considered the materials we sent superfluous. One very large employer (receiving several packets for each of their several claimants) called to complain that we were interfering with their employees and upsetting their relationship with the union. Another large municipal employer, also with several claims filed against them in the initial period, called to ask us not to send them any more packets, since they were running out of shelf space.

Employers appeared wary of the offer of an ergonomic walk through. The one employer representative who accepted our offer had developed a safety program that he wanted to showcase. We negotiated at length with several other employers, but in the end each choose not to accept the offer. One enthusiastic newly hired safety officer working for a very large

employer worked with us for some weeks to set up the walk through, but abruptly stopped returning our calls. Another safety officer, whose company had many claims filed during the initial period, also stopped returning our calls. Shortly after we found an article in the paper indicating that his company was closing down and moving the majority of their jobs out of the country.

The intervention may have been ill timed with respect to the national climate. It came on the heels of a contentious, polarizing national political debate followed by the rolling out and swift withdrawal of the ergonomics standard. During that debate, employers were often pitted against unions and the public health community. Employers may have viewed ergonomics as an irritating remnant of a debate already laid to rest. Added to this may have been employer disinclination share their work practices in order to protect their competitiveness. Since the intervention is so inexpensive, it might be worthwhile trying again in a less contentious political climate.

Reaching claimants

Reviewed by 56 % of intervention claimant respondents, the educational packet did reach a majority. Of course, we have no way of knowing how many non-respondent intervention claimants reviewed the intervention materials.

The video, however, did not appear to be an effective way to reach claimants. While, encouraged by the advisory committee responses, we expected this humorous-mini-documentary format to be an effective method of communicating with claimants; very few (14%) even put them in the VCR. Given the current decline in VCR usage and upswing of DVDs, future information of this sort should be in DVD format.

Perhaps presenting information in short bursts through a local cable channel should be considered. A competition among college students with media majors might generate good short commercial-like educational videos. This would serve the purpose of educating both the video makers and the viewing public. They would reach a larger although less targeted audience.

Finally, the Internet does not appear to be a good way to communicate with workers yet, since only 7 percent of respondents reported looking for information on workers' compensation via the Internet.

The information they wanted when they wanted it

In advisory groups prior to the intervention, claimants had voiced the wish that information on workers compensation had been included in their hiring packets. In fact, only 23% of survey respondents told us that they had received any workers' compensation information from employers. In fact, during the focus groups, claimants said that they knew very little about workers compensation before they were hurt. Most (58%) got their information from lawyers.

Sharing information with new employees about safety, including employer and employee areas of responsibility and rights (employee rights to workers' compensation and employers not be sued) employers serve to engage both workers and employers in a partnership that may yield prevention benefits, reducing both injuries and workers' compensation costs. This would

probably be the best translation of this research. Such mutual engagement and commitment would act as a force multiplier in the reduction of UECTDS.

Future analysis

We wish to know whether the intervention was more effective with employers that had around 50 –150 employees. Firms of this size would not have access to corporate ergonomics resources, and may have enough injuries over time to recognize the risk. Analysis plans with this data include the construction of an employer size variable for the 436 employer. We will use national sources on the size of publicly traded firms. We will evaluate that variable against employer size as reported by the 205 claimants during the first interview.

We also wish to know whether the educational materials helped make work more productive. We also collected information on work productivity, using a scale developed by Lerner^{xi} et al. We will analyze this data.

SCIENTIFIC REPORT

Specific Aims and Hypotheses

1. Reduce the incidence of upper extremity cumulative trauma disorders (UECTDs) in Maryland by a targeted educational campaign to encourage preventive interventions.
 - a. Develop an ongoing system to identify individuals with new workers compensation claims for UECTDs, their employers, and their physicians.
 - b. Develop educational interventions to alert employers, injured workers, employee organizations and physicians to preventive interventions.
 - c. Develop an information and referral system to improve access to ergonomic consultative services.
 - d. Conduct a controlled trial of delivering these interventions
 - e. Demonstrate effectiveness of the intervention by measuring incidence of subsequent UECTDs involving employers who received interventions compared to employers who did not.
2. Improve the health outcomes of Maryland workers who develop UECTDs by increased awareness and access to rehabilitative services
 - a. Develop educational interventions to improve access by patients and health care practitioners to rehabilitative services
 - b. Conduct a controlled trial of delivering these interventions
 - c. Measure the impact of this educational intervention on health outcomes in patients with UECTDs, comparing those receiving the intervention to a comparison population.

Hypotheses to be tested:

The randomized trial of educational intervention will permit testing of the following hypotheses:

- a. An educational intervention will significantly reduce the incidence of subsequent UECTDs involving employers who received interventions compared to employers who did not.
- b. An educational intervention will significantly improve functional outcomes in patients who receive, and whose physicians receive, the intervention, compared to those patients who do not.

Background

At the end of the 90's, cumulative trauma disorders which affect the upper extremity remained a major cause of lost time injuries in American industry. The conditions grouped under this heading include tendonitis of the shoulder, arm and wrist, tenosynovitis, deQuervain's syndrome, epicondylitis, ulnar nerve entrapment and carpal tunnel syndrome. The Bureau of Labor Statistics (BLS) 1995 Report on Lost-Workday Injuries showed that employees disabled by carpal tunnel syndrome, the most common of the UECTDs, experienced a median of 30 days away from work, the largest median lost-work day rate among disabling conditions

Numerous studies had shown a strong association between the incidence of these conditions and specific industries. Studies had also shown that UECTDs are very strongly associated with tasks involving repetition, forceful exertions, and constrained or static postures, usually found in

combination.ⁱ The rising incidence of these conditions during the last eighties and early nineties has been attributed to better recognition, to the explosive increase in the use of computers, (without a corresponding increase in widespread sophistication about people/machine interfaces), and to improvements in manufacturing processes that have led to faster speeds and shorter cycle times. In 1996, the BLS estimated there were 439,000 newly reported cases of occupational illnesses in private industry in the United States. Disorders associated with repeated trauma, the category that includes UECTDs (along with noise induced hearing loss) represented 281,000 or 64% of these cases.ⁱⁱ As investigations by NIOSH and others elucidated the nature of the problem,ⁱⁱⁱ it has become possible to redesign and adapt equipment, and to reorganize workplaces to prevent UECTDs.^{iv v vi vii}

The results of our previous studies in Maryland have underlined the severity of these injuries. Research elsewhere had pointed suggested some avenues for successful prevention. Research into treatment and rehabilitation of individuals with UECTDs had shown benefit from programs that focus on rehabilitation and return to work. Even in the most successful of these studies, however, a significant number of patients remain unable to return to work, underlining the need to give primary workplace based prevention the highest priority. Only a few studies have looked at the impact of the injury on functional capacity, and these have shown substantial continuing impairment.^{viii} For those cases that do continue to occur, early intervention with emphasis on functional recovery and return to modified work could have improved outcomes. Would outcomes have better if all injured workers, their physicians, and their employers could take advantage of appropriate rehabilitative services.

Could educational interventions increase the likelihood that preventive measures will be undertaken in the workplace? Prior efforts to use the SENSOR approach in California found few employers accepted offered ergonomic consultation and assistance^{ix}. At the outset of this study, we thought that times had changed. With greater recognition of the problem, and a developing consensus on the need to act, California adopted regulations mandating ergonomic interventions. Employers, like the rest of the public, increasingly recognize that UECTDs are preventable, even if they are not sure how. There was reason to believe that Maryland employers would have been at “teachable moment”, and would be more interested in learning how to prevent UECTDs if given the opportunity.

The experiences that investigators Keogh and Gordon have had with previous non-regulatory public health campaigns in Maryland offered some encouragement. During the first decade of a campaign to identify and investigate adult lead poisoning in Maryland, (supported by the NIOSH ABLES program) incidence of severe poisonings has dropped dramatically. Project KISS (Kids in Safety Seats), was also a successful educational campaign using a comprehensive approach to reduce childhood injuries and fatalities resulting from unrestrained children in automobiles.

Prior to this project, we had demonstrated our ability to identify individuals with UECTDs and to measure a variety of medical, occupational and social outcomes. This previous research project tested the effectiveness of a coordinated educational intervention in mobilizing the concern and good will of those most directly involved with the problem, assisted by the resources now available in our communities. This project we are reporting on used an approach that involved all of the parties able to influence outcomes (patient, physician, and employer), and hence had an

increased likelihood of impact.

Two Major Questions of the Study

One major question of the study was to determine whether a relatively inexpensive educational intervention delivered randomly to employers receiving a Workers' Compensation UECTD claim, to their claimants and to the claimants' physicians would reduce the number of claims against intervention vs. control employers in the subsequent period-beginning one year later. Since claims are often filed long after initial symptoms begin, a reduction in claims would probably reflect a change in work patterns several months earlier. The one year lag was to allow time for the intervention to work. . Further purposes centered on the claimants.

The other major question was whether intervention claimants were more likely to have used vocational rehabilitation, less likely to be unemployed following the intervention, have better scores on the activities of daily living scale, better functioning at home, work and sleep, and less depressed

METHOD

Design of intervention

Prior to the intervention we conducted separate employer, claimant and physician advisory meetings, and based our intervention educational packets on the issues they raised. We researched available materials and assembled intervention packets including sections on workers' compensation in Maryland, basics of ergonomics, a description of how to set up a workstation, and ergonomics success stories. In addition we prepared a video illustrating with humor the interaction of injured workers, their employers and physicians to reduce further injuries to the worker and his/her co-workers. The video was included in employer and claimant intervention packets. An offer to employers of an ergonomic walk through was included with the packet.

Identification and randomization of employers

We identified claims by visually inspecting the computer image of every workers' compensation claim form filed in Maryland between February 14, 2002 and December 31, 2003. This is the initial period. If the description of the injury (slow onset, diagnosis, due to "repetitive motion" and the body parts (neck shoulder, arm and or hand) were consistent with an upper extremity cumulative trauma disorder the claimant was included in the study. Each new employer identified was checked against a list of previous employers assigned sequentially to a list of sequential numbers randomly assigned to intervention or control, using SPSS. If the employer was not yet on the list, it was added, and assigned randomly intervention or control, and the claimant was also assigned to the same intervention/control category as the employer. If the employer was already on the list (some other UECTD claimant had already filed a claim during this period) the employer intervention category had already been assigned, and the claimant also took the same category, intervention or control. Because there were few physicians serving many claimants, it was not possible to assign them to exclusive intervention vs. control categories. Physicians identified by intervention claimants would receive an educational packet, even if a control claimant had identified them previously.

The intervention (educational packets) was delivered to employers, physicians and claimants assigned to the intervention arm, if the potential claimant did not refuse to participate by returning the card by 10 days after the initial participant mailing went out. Intervention employers were offered a free ergonomics walk-through with a professional ergonomist. Only one employer accepted the offer. Group sessions on ergonomics were also offered to all intervention claimants and several were offered in widely spaced geographic areas. Despite several invitational post cards and follow-up phone calls, claimants displayed little interest, and attendance was very poor.

When intervention was complete, that unique number (unique since many employers had more than one claim filed against them) of employers (436) (with claimants who did not refuse by returning the post card) just exceeded 400 which was the number calculated as sufficient to detect the expected difference from the intervention. After a year and four months (the extra 4 months to permit the MWCC to update its files) had elapsed since the last UECTD was identified, we submitted a list of employer numbers identified as having UECTD claims filed against them in the initial period to the Maryland Workers' Compensation Commission. The Commission returned a file with claim and employer numbers for all claims filed in the same period during the following year: 2/14/03-12/31/2003. We matched the employer numbers against our list of employer numbers with UECTDs from the first period and identified employers who had subsequent claims in that period – in excess of 6000. We searched computer images of these claims as before to determine whether they were for UECTDs. In this way we were able to determine the number of UECTD claims filed against employers who received the educational intervention vs. those that did not.

Method- Claimant Surveys

The other question was whether claimants identified during the search of WC claim form images and given the educational intervention would receive more therapies, have better functional and better work related outcomes than the control claimants. We conducted three CATI surveys using VOXCO software. The first was conducted on average 8.8 months after the claim was filed, and the second was conducted an average of 14.5 months after the claim was filed. The third wave began in March 2004 and ended in July 2004.

This lag between claim and initial identification of claimant, and then to survey took longer than originally anticipated. Identifying UECTD claims had to be done by a hand search of Maryland Workers' Compensation computerized image records. We had originally had another method in mind. During conversations with the Commissioner and Director of Administration, they had agreed in principal to assigning one of their staff to screen claims as part of their coding process and identify those with potential UECTDs for us. Unfortunately, a new Commissioner and Director of Administration were appointed after the grant was awarded. They were faced with a physical move and staff shortages. This meant two things: there was a WC delay in entering the claims information into the database, and we had to do the screening ourselves, which took longer and which we reported to you in previous Progress Reports.

ANALYSIS

Test of intervention effect on subsequent claims against employers

A differences in the number of subsequent claims among intervention vs. control employers were tested using a One way ANOVA.

A difference in whether one or more subsequent claims were filed against an employer depending on intervention status was tested using a chi square test of differences in distribution.

A logistic regression was used to test whether an employer received a subsequent claim as a function of the number intervention packets it received, controlling for the number of claims it had received during the initial period was also conducted.

A third analysis was conducted using multiple regression claimed against intervention employers compared to control employers was tested the outcome variable was the number of subsequent claims (ranging between 1 and 3 with all those over 3 collapsed into 3), adjusting for the effect of number of claims during the initial period against that employer.

Variables used in the employer analysis.

Dependent

X2NDHIT2_ How many claims did the employer receive in the subsequent period?
Values ranged from 0 to 3, with those few with more than three collapsed into the 3 category.

HITAGAIN Did the employer receive another UECTD claim in the 9.5-month period beginning one year later (subsequent period)? Yes answers are coded "1", and no answers are coded "0".

Study variables

INTERVENTION was coded "1" and control was "0".

XNMPACK Number of intervention packets sent to employer categorized. The range is from 0 (for controls), and 1 through 4 with 4 containing those few that are higher).

Potential confounder

XINIT Number of initial claims – the number of times the employer received claims during the initial period

Municipal a state or local government entity

It is possible that despite randomization that employer characteristics could be unevenly distributed by intervention vs. control groups. This could mask or be mistaken for an effect of the intervention. We coded employer type into several categories and tested whether the distributions differed by intervention status. Intervention employers were slightly more likely to be government entities. We therefore controlled for them in the logistic and linear regressions described above.

It is possible that, despite randomization, characteristics of the 654 claimants were unequally

distributed in such a way as to reflect differences in employers. Such differences might mask or be mistaken for an effect of the intervention. We examined UECTD claimant characteristics by intervention status, comparing groups using ANOVA for continuous outcomes, and Chi Square tests of distribution for categorical outcomes. We found only that intervention claimants were more likely to be single, but did not control for this.

Tests of the effectiveness of the intervention on claimant functions, home and work related performance, and use of vocational rehabilitation

Tests of the differences in ADL by intervention were done using a one-way ANOVA, equivalent to the student's T test. In general, results reported in the tables as means were tested this way. Frequency distributions with more than two categories were tested using the chi-square. The CES-D, functioning in sleep, work and household activities were tested using Chi Square.

Where differences were found on characteristics of the workers or their work by intervention status (using ANOVA and chi Square tests as described above), those variables were used in equations to control for their potential confounding of the intervention on the outcomes. In the first claimant interview, those in the intervention group took a little longer to reach, and their employers were a little larger, so days between claim and interview was used to test any outcome significantly different by intervention status. This was done with a regression equation (logistic or linear depending on the outcome), with both potential confounders and study variable in the equation. Each potential confounder is subsequently removed to determine whether the standard error of the regression coefficient of the study variable differs significantly with each removal. If not, then the p-value of bivariate association between study variable and outcome is accepted.

We also examined differences between claimant respondents and non-respondents on characteristics that were available to all from the workers' compensation data, age, weekly wage, gender and marital status. This was to determine whether there were any obvious differences between respondents and non-respondents. While we cannot generalize from the sample to the population with less than one third responding, we can at least see whether there are any obvious differences.

Variables used in the claimant analyses are described in tables 4 through 11.

RESULTS

Table 1 all of the specific aims have been completed.

Specific Aims

Reduce the incidence of upper extremity cumulative trauma disorders (UECTDs in Maryland by a targeted educational campaign to encourage preventive interventions	
1. Develop an ongoing system to identify individuals with new workers compensation claims for UECTDs, their employers, and their physicians	done
2. Develop educational interventions to alert employer, injured workers, employee organizations and physicians to preventive interventions	done
3. Develop an information and referral system to improve access to ergonomic consultative services referral system to improve access to ergonomic consultative services	done
4. Conduct a controlled trial of delivering these interventions	done
5. Demonstrate effectiveness of the intervention by measuring incidence of subsequent UECTDs involving employers who received interventions compared to those who did not	done
Improve the health outcomes of Maryland workers who develop UECTDs by increased awareness and access to rehabilitative services	
6. Develop educational interventions to improve access by patients and health care practioners to rehabilitative services	Done
7. Conduct a controlled clinical trial of delivering those interventions	done
8. Measure the impact of this educational interventions on health outcomes in patients with UECTDs, comparing those receiving the intervention to a comparison population.	done
Hypotheses to be tested:	
1. An educational intervention will significantly reduce the incidence of subsequent UECTDs involving employers who received interventions compared to employers who did not	Done Some additional analyses planned
2. An educational intervention will significantly improve functional outcomes in patients who receive, and whose physicians receive, the intervention, compared to those patients who do not.	Done Some additional analyses planned

Development of the intervention

For detailed reports on the intervention development, please see earlier interim grant reports. In summary we assembled advisory groups of employers, physicians and claimants to learn what information they most needed and how best to present it to them. Employers advised stressing cost savings from injury reduction. Advisory physicians knew very little about how the system worked and wanted forms to help guide them as they dealt with workers' compensation claimants. We provided that. Also Dr. Cloren presented a session at Maryland Med-Chi in 1999 on the Workers' Compensation issues. Advisory claimants urged employers to communicate with new employees about safety issues that included information on workers compensation, preferably in their work packets. We asked advisory groups what they thought of a video tracking a UECTD claimant's experience from initial injury, interaction with physician, treatment, physician and claimant interaction with employer, adjustment of workplace tools and activities and eventual full return to functioning. Physicians said they would not watch it, employers said they would probably watch it if we said we had sent one to the claimant, and claimants said maybe they would watch it.

Based on advisory committee advice, we developed the intervention materials, an educational packet and a video. We visually inspected around 20,000 claims filed between Feb 14 and Dec. 31 2002. We selected those that (654) that described UECTDs, and randomized their 436 employers. Two hundred twenty were in the intervention group and 216 in the control group. Claimants were assigned to the intervention status of their employers: 326 in both intervention and control groups. Intervention employers, claimants and claimants' physicians were sent the intervention packets.

To test the effectiveness of the intervention, we collected claims filed one year later, this time aided by a Maryland Workers' Compensation Commission file containing only claims filed against randomized employers, between February 15 2003 and December 31, 2003. We then compared UECTD incidence for each employer in the subsequent period by intervention status.

Subsequent claims against employers.

Four hundred and thirty six employers with UECTD claims were identified in the initial period. Two hundred and twenty were randomized into the intervention group, and 216 into the control.

In order to test for differences in intervention vs. control that might have occurred despite the randomization, we coded the employers by sector. The sectors are as follows in Table 1. Only one sector, "municipal", that includes being a state or local government employer, was more common among the intervention group (Chi Square p-value=0.05). In testing the intervention we will therefore adjust for the effect of being a governmental employer.

Testing the effectiveness of the intervention to reduce subsequent claims.

First, it is important to check to see whether the intervention was successful in separating employers into equivalent groups. Table 2 shows the employer categories that we coded. Only municipal, compared against all others in a bivariate Chi Square, was significantly more common among intervention employers.

Table 2 Employer sectors by intervention status.

Sector	Intervention N=220		Control N=216		Total N=436	
	N	%	N	%		
Service	42	19.1	57	26.4	99	22.7
Manufacturing	41	18.6	46	21.3	87	20.0
Municipal	36	16.4	22	10.2	58	13.3
Grocery	24	10.9	22	10.2	46	10.6
Retail	18	8.2	15	6.9	33	7.6
Construction	17	7.7	9	4.2	26	6.0
Healthcare	16	7.3	20	9.3	36	8.3
Financial	9	4.1	11	5.1	20	4.6
Utility	5	2.3	2	.9	7	1.6
Transportation	3	1.4	3	1.4	6	1.4
Poultry Processing	3	1.4	1	.5	4	.9
Missing	6	2.7	8	3.7	14	3.2

Sixty-three received repeat claims in the subsequent period; 33 in the intervention group and 30 in the control group. This represents a mean of .23 repeat claims among intervention employers compared to a mean of .21 among control employers. This is not a statistically significant difference.

For the 436 employers identified with UECTD claims in the first period, there were an average of 1.33 claims per employer in the intervention group and 1.36 in the control. Of the 63 with repeat claims in the 2nd period, there were an average of 1.85 claims in the intervention group and 1.57 claims in the control group.

Table 3

Controlling for the number of initial claims (xinit), and whether a government entity (municipal), the number of intervention packets (xnmpack) sent out had no impact on whether an employer received a claim in the subsequent period Table 2 logistic regression). Only the number of claims in the initial period against the specific employer increased the likelihood of a subsequent claim.

Variables in the Equation

Table 3

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
								Lower	Upper
Step 1(a)	xinit	1.223	.204	35.820	1	.000	3.399	2.277	5.073
	xnmpack	.132	.196	.457	1	.499	1.141	.778	1.675
	municipal	-.081	.433	.035	1	.853	.923	.395	2.157
	Constant	-3.526	.320	121.382	1	.000	.029		

a Variable(s) entered on step 1: municipal.

Nor were the number of claims in the subsequent period related to the intervention, adjusting for the number of claims in the first period and whether the employer was a governmental entity (Ordinary least squares regression).

Coefficients(a)

Table 4

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.553	.081		-6.830	.000
	interventionE	.045	.069	.028	.660	.510
	municipal	.096	.100	.041	.958	.338
	xinit	.618	.052	.503	11.798	.000

a Dependent Variable: number of claims 2nd pd

a Dependent Variable: x2ndhit2

While these results are disappointing, some subgroup analyses remain to be done. We need to see whether the size of the employer makes a difference. Employers that are mid-level in size, for example between 50 and 150 workers, may be particularly receptive to the intervention. Larger employers often already have some ergonomic program in place, and small employers may have too little experience of injuries to see the need for help in prevention.

We are developing an employer size variable. For employers whose claimants responded to the survey, we have their report of number of workers at the worksite. We have also collected an employer variable from a Dunn and Bradstreet database, accessed at the University of Baltimore Law School. We need to compare these numbers and construct a final size variable.

Claimants.

Claimants carried the intervention number assigned to their employer. To satisfy ourselves that the intervention divided the groups equally, we compared worker characteristics by intervention status (table 4). We use data collected from the workers' compensation claim form.

They divide equally, with 326 in each group. The only difference is in marital status, with more of those in the intervention group being single.

Table 5

Characteristics of claimants identified as likely UECTDs from injury description on claim: by intervention status								
		Intervention status				total	percent of total	
		Intervention		Control				
All Claimants		326	50%	326	50%	652		
Refusals	by post card	50	15%	52	16%	102	16%	
	at interview	65	20%	62	19%	127	19%	
								35%
Not eligible at interview		12	6%	17	15%	29		12%
completed 1st interview		108	53%	97	47%	205		31%
completed 2nd interview		92	52%	84	48%	177		27%
completed 3rd interview		60	50%	60	50%	120		18%
Weekly wage	mean	\$647.90		\$645.40		\$646.64		
	sd	\$386.21		\$300.60		\$345.58		
	n	300		303		603		
Age in years in 2002	mean	45.8		45.7		45.8		
	sd	12.69		12.5		12.59		
	n	325		326		651		
Gender - females		200	62%	208	64%	408		63%
	males	125	38%	117	36%	242	650	
Marital status*- married		166	54%	195	62%	361		58%
	single	144	46%	119	38%	263	624	
* There are proportionately more single people in the intervention group than in the control group -prob < .05								

* There are proportionately more single people in the intervention group than in the control group -prob < .05

Table 6

Since only 31% of claimants responded to the first interview, and 27% to the second, we are unable to generalize findings to Maryland UECTD claimants in general. With the information at hand, we compare respondents to non respondents, to see whether respondents differ on important demographic factors.. Among claimants filing between mid February and the end of December 2002, we found no significant differences between respondents and non respondents in marital status, weekly earnings or gender. Hence from our data, we find no evidence to suggest that responders were different from non-responders. Moreover, while not generalizable, the roughly 30% who responded are 30% of the UECTD claimants in that time period, and thus the findings do reflect the experiences of a sizable portion of those who file claims for UECTDs in Maryland.

Table 6

Claimant characteristics – Respondents and Non-respondents		
	Claimants	
	Respondents N=208	Non respondents N=446
Weekly wage		
Mean	\$654.49	\$643.33
Sd	\$329.77	\$352.07
N	191	415
Female	130 (64%)	282 (62.5%)
Married	119 (61%)	243 (56%)

Table 7

We next look at the 205 claimants who responded to the first survey (Table 5). Here too they divide fairly equally by intervention, with only two differences. Those in the intervention group took slightly longer to reach (about a month), and worked for slightly larger companies (median of 50 vs. 40). If we find differences in outcomes, we will test whether those differences persist when the employer size and days between claim and in interview are entered into the equation.

The characteristics of claimants responding to the first survey were on whole similar whether they received the intervention materials or whether they were controls . Intervention respondents were like controls in age, ethnicity, educational level, gender, marital status, wages at time of injury, years doing the job, use of keyboard at work, carpal tunnel diagnosis, and interference of injury with daily activities at home, work and play at the time they first saw the doctor. This last is a proxy for injury severity. However, it took a little longer (31 days longer on average) to reach intervention than control claimants. Also, intervention claimants worked for slightly larger companies (median of 50 employees/workplace vs. 40 for control participants).

Table 7 Claimant characteristics by intervention status: Claimants responding to first interview			
	Intervention	Control	Total
Participants in 1 st interview	108	97	205
Age- in years in 2002	46.1	44.2	45.2
Mean	9.45	9.28	9.24
Standard deviation	108	97	205
N			
Ethnicity African American (not Hispanic)	40 (37%)	31 (32%)	71 (35%)
White	64 (59%)	61 (63%)	125 (61%)
Hispanic	1 (1%)	3 (3%)	4 (2%)
American Indian or Alaskan Native	1 (1%)	1 (1%)	2 (1%)
Asian or Pacific Islander	0	1 (1%)	1 (0.5%)
Other or unknown	2 (2%)	0	2 (1%)
Education level			
0=less than high school graduation	19 (18%)	15 (16%)	34 (17%)
1=high school diploma or GED	43 (40%)	36 (37%)	79 (39%)
2=at least some college	46 (43%)	46 (47%)	92 (45%)
Married or living with a spouse or partner	60 (60%)	59 (62%)	119 (61%)
Female	64 (60%)	66 (69%)	130 64%
Weekly wage mean	\$652.93	\$656.14	\$654.49
sd	301.37	358.93	329.77
n	98	93	191
Number of employees at workplace*			
Median	50	40	50
Range	1-3500	1-1800	1-3500
N	92	82	175
Years doing this job			
Median	7.5	7.0	7.0
Range	.17-42	.08-40	.08-42
N	108	97	205
Union member	47 (44%)	40 (44%) (	89 (44%) (
Uses a key board 1=all day, 2= more than half the time, 3=half the time, 4=less than half the time,5=not at all			
mean	3.51	3.40	3.46
sd	1.77	1.77	1.77
n	108	97	205
Carpal Tunnel Diagnosis	76 (71.0%)	68 (73.9%)	144 (72.4%)
Days between claim and interview* mean	281	248	266
sd	115	103	110
n	107	96	203
Interference with normal activities just prior to initial physician visit 1 =every day – 4=“not at all”			
Sleep mean	1.80	1.68	1.75
sd	1.00	.95	.98
n	107	91	198
Reg. Job duties mean	1.54	1.56	1.55
sd	.920	.94	.93
n	105	89	194
Household mean	1.60	1.63	3.70
sd	.963	.93	.83
n	106	92	188
*p value >0.05			

Table 8

Claimant respondents to the first interview obtained information on Workers' Compensation mainly from lawyers (56%), the Workers' Compensation Commission (30%), their employers(23%), from co-workers (19%), the boss (18%) and from family and friends (17%) Few learned about Workers' Compensation from union representatives (10%) or physicians (9%), and fewer still from universally available sources like the Internet (7%), books 0.5%, magazines (0.5%).

Table 8 Sources of information about workers' compensation from 1st survey

	Intervention	Control	Total
Family and friends	17 (16%)	18 (19%)	35 (17%)
Doctor	11 (10%)	7 (7%)	19 (9%)
The boss	18 (17%)	18 (19)	36 (18%)
Co-workers	19 (18%)	20 (21%)	39 (19%)
Magazines	1 (0%)	0 (0%)	1 0.5%
Books	1 (0%)	0 (0%)	1 0.5%
Internet	7 (6.5%)	7 (7.2)	14 (6.8%)
Lawyer	58 (54.2%)	60 (61.9%)	118 (57.8%)
Employer	23 (21.3%)	24 (25%)	47 (23%)
Union representative	7 (6.5%)	13 (13.5%)	20 (9.9%)
Maryland Workers Compensation Commission	31 (28.7%)	31 (32.3%)	62 (30.4%)

Tables9

Just over half (56%) of the intervention claimant respondent to the first survey actually looked over the packet containing the educational intervention. Thirty-two of the forty people who read the section on basics of ergonomics found it useful. Thus that section was judged useful by 80% of those that read it, but by only 43% of the intervention group as a whole. The video, designed to promote communication among physicians, employers and claimants fostering ergonomically friendly workplaces and safer workers was viewed by only 14% of the intervention claimants, and judged useful by just over half of them (60%), but by only 8% of all the intervention claimants. Thus, the message in the video reached very few claimants.

Table 9

Use and usefulness of claimant intervention packets: Asked of 108 Intervention claimants responding to first interview

	Read/Viewed		Found it useful	
	N	%	N	%
Entire Packet	61	56%		
Workers Compensation	50	46%	46	43%
Vocational Rehabilitation	39	36%	35	32%
Basic Ergonomics	40	35%	32	30%
Ergonomics Committees	31	29%	22	20%
Viewed Video	15	14%	9	8%
Video helped talk with your Doctor			7	6%
Video helped you talk with your supervisor or employer			9	8%

Table10

Claimant respondents to the first survey were not different by intervention status with respect to their ADLs, mood, use of vocational rehabilitation or whether they were working at the time of the interview. However, those who were in the intervention group were less likely to have lost their job as a result of the injury (10% vs. 23% of controls). Similarly, intervention respondents were less likely to be fired or laid or laid off as a result of the injury (10% vs. 21% of controls).

Table 10

Claimant outcomes by intervention status:

		intervention	control	Total	
Average impairment to daily living scale (1=no problem, 2 can do but with difficulty, 3 can' do at all)					
	mean	1.50	1.49	1.50	
	sd	0.40	0.35	0.37	
	n	108	97	205	
Interference with normal activities in the last two weeks 1="every day" – 4="not at all"					
Sleep	mean	2.81	2.71	2.76	
	sd	1.19	1.16	1.17	
	n	108	96	204	
Work	mean	2.74	2.72	2.73	
	sd	1.25	1.25	1.25	
	n	92	79	171	
Household	mean	2.62	2.45	2.54	
	sd	1.17	1.17	203	
	n	106	97	1.17	
CES-D depression scale (16 or above indicates depression in epidemiological studies)					
	mean	14.9	15.9	15.4	
	sd	13.6	12.8	13.2	
	n	94	85	179	
Received Vocational Rehabilitation		11	10%	12	13%
Working at interview		68	63%	57	59%
Lost job as result of injury* ^a		11	10%	22	23%
Fired or laid off as a result of injury* ^a		11	10%	20	21%
* p-value < 0.05					

Most (86% or 176 of 205) of the respondents in the first survey also responded to the second which took place on average 14.5 months after the first. There were no differences in claimant characteristics by intervention vs. control.

24

Table 12.

Outcomes among claimant respondents to the 2nd interview were not different by intervention status among the following measures: ADLs, mood, whether working, working for the same employer, doing the same job, work interference or sleep interference. However, intervention claimants reported less interference from their UECTD problem when performing household activities or recreational activities than controls.

Table 12

Claimant outcomes 2nd interview by intervention status:

		intervention		control		Total	
Average impairment to daily living scale (1=no problem, 2 can do but with difficulty, 3 can' do at all)							
	mean	1.44		1.48		1.46	
	sd	0.36		0.34		0.35	
	n	92		84		176	
Received Vocational Rehabilitation		14	15%	14	17%	28	12. %
Interference with normal activities in the last two weeks 1="every day" – 4="not at all"							
Sleep	mean	3.11		2.88		3.01	
	sd	1.07		1.11		1.09	
	n	92		84		176	
Work	mean	3.02		2.89		2.96	
	sd	1.35		1.40		1.37	
	n	84		72		156	
Household/play*	mean	2.89		2.49		2.70	
	sd	1.18		1.19		1.20	
	n	92		83		175	
CES-D depression scale (16 or above indicates depression in epidemiological studies)							
	mean	14.4		16.6		15.5	
	sd	12.9		12.9		12.9	
	n	86		78		164	
Working at interview		64	70%	56	67%	120	68%
Working for same employer		55	86%	43	77%	98	82%
Doing the same job		41	75%	37	86%	78	80%

* p-value < 0.05

Table 13

2nd survey claimant outcomes did show some differences the comparisons were between those who reviewed the intervention materials vs. all others (controls and interventions who did not review intervention materials). While there were still no differences in ADL scores, whether working and how often the UECTD interfered with work, differences emerged among work patterns, mood and performance of non work related activities. Respondents who reviewed the intervention materials were sleeping better, and doing household tasks with less difficulty than controls. Their moods were marginally higher (less depressed at CES-D scores of 13.6 vs. 16.9). They were less likely to be doing the same job, and marginally more likely to be working for the same employer

Table 13

Claimant outcomes 2nd interview by whether claimant reported looking over intervention materials:

		Looked at intervention materials		No review of intervention materials	Total	
Average impairment to daily living scale at 2 nd interview (1=no problem, 2 can do but with difficulty, 3 can't do at all)						
	mean	1.43		1.48	1.46	
	sd	0.36		0.35	0.35	
	n	68		108	176	
Received Vocational Rehabilitation						
		11	16%	17	16%	28 16%
Interference with normal activities in the last two weeks 1="every day" – 4="not at all"						
Sleep*	mean	3.22		2.87	3.01	
	sd	1.05		1.1	1.09	
	n	68		108	176	
Work	mean	3.08		2.88	2.96	
	sd	1.28		1.43	1.37	
	n	61		95	156	
Household**	mean	3.01		2.50	2.70	
	sd	1.10		1.22	1.20	
	n	68		107	175	
CES-D depression scale (16 or above indicates depression in epidemiological studies) +						
	n					
	mean	13.2		16.9	15.5	
	sd	13.3		12.5	12.9	
	n	63		101	164	
Working at interview						
		64	70%	56	67%	120 68%
Working for same employer+						
		43	90%	55	76%	98 82%
Doing the same job*						
		30	70%	48	87%	78 80%

+ p value < 0.1. p-value < 0.05, ** p-value < 0.01

CONCLUSION

While the inexpensive intervention did not reduce the number of subsequent UECTD claims, claimant-respondents who received the intervention appeared better able to manage their work and keep their jobs. Those claimants who actually looked over the intervention did better at home and at rest. The educational materials may have provided tools needed to modify their work tasks, pace or setup to maximize productivity while protecting their health. Highlighting engineering changes to may have drawn employer attention to the role of the work task in generating the injury, and may stimulated employers to work more flexibly with injured workers. Claimants who reviewed the materials may also have enjoyed a better sense of well being than control claimants, perhaps an outcome of better adjustment at home and work.

Claimant benefits were more striking for those who reviewed the packet, suggesting that benefits arose out of their efforts. Their efforts may have stimulated employer response, although we saw no direct evidence of employer changes in our data.

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**National Institute for Occupational Safety and Health
Office of Extramural Programs**

Final Report Summary

Title: Prevention--upper Extremity Cumulative Trauma Disorders

Investigator: Patricia Gucer

Affiliation: University of Maryland Balt Prof School

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Telephone: (410) 706-7464

Award Number: 5R18OH003619-03

Start & End Dates: 9/1/1999-8/31/2004

Total Project Funding: \$920,589

Program Area : Intervention Effectiveness Research Methods

Final Report Abstract:

The purpose was to determine whether a simple, inexpensive educational intervention packet sent to claimants, employers and physicians would reduce subsequent workers compensation claims for UECTDS, improve function for injured workers, and increase claimant use of vocational rehabilitation.

We delivered the packets to 220 employers randomly selected from the 436 receiving Maryland Workers Compensation claims for UECTDs between mid February and December 2002. A similar packet was sent to 326 workers filing claims against those 220 intervention employers during that same period. Their physicians also received packets. Three hundred twenty six claimants were in the control group, having filed claims against one of the 216 control employers.

The packet contained information on how to reduce common UECTD injuries, UECTD prevention strategies among employers, physicians and claimants, resource lists, and information on vocational rehabilitation, workers compensation and physician referrals to guide history taking.

We inspected subsequent claims filed from mid Feb. 2003 through Dec. 2003. There was no difference in the number of subsequent claims for intervention compared to control employers.

We surveyed 31% of claimants on average 8.8 months after the claim, and 27% 14.5 months after the claim. We also surveyed 19% in a 3rd interview, not yet analyzed. Surveys collected information on capacity to perform ADLs, mood, use of vocational rehabilitation, and functioning at work and home.

Neither claimant ADL scores nor use of vocational rehabilitation differed by intervention status.

The intervention did appear to have an effect on job structure and retention. An average of 8.8 months after the claim intervention claimants were less likely to have left their job due to their injury and less likely to have been fired or laid off. Evidence suggests that benefits to the intervention claimants are likely to have been due to their own efforts. By 14.2 months on average those intervention claimants who had reviewed the educational material were less likely to be doing the same job at work but marginally more likely to be working for the same employer than controls.

Intervention claimants functioned better at home and recreation than controls an average of 14.5 months after the claim. Those who had reviewed the materials were also sleeping better, and marginally less depressed.

Just over half the responding intervention claimants reported looking over the packet. The video proved a less effective technique for reaching claimants. Only 14% of claimant respondents viewed a video.

Claimants reported receiving information on Workers Compensation mainly from Lawyers. Less than 25% received information from employers. Very few (7%) sought information on the Internet, and less than half from print sources

Publications:

Lerner D, Amick BC III, Lee JC, et al: Relationship of Employee-Reported Work Limitations to Work Productivity. Medical Care 41:649-659, 2003. MAY

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