

**OFFICE ERGONOMICS ASSESSMENT FOLLOW UP**  
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**Abstract**

Ergonomists have been completing office ergonomics assessments, and facilitating changes, for decades. By following sound practices, such as those outlined in the CSA guidelines and other research papers, the ergonomist's assumption is that implementing "improvements" to jobs leads to a reduction in discomfort and injury risk. This paper reviews the results of a quantitative follow up survey. Following the consulting company's assessment process, pre-assessment surveys are always completed by employees who are scheduled to have an assessment. The assessment process includes a review of the survey, employee interview, job observations, measurements, immediate adjustments to the chair and workstation, employee administrative controls (e.g. left-handed mousing or more frequent breaks), and recommendations for further changes involving purchases (e.g. footrests or document holders), or repairs (e.g. chair cylinder replacement, adjustments to panel-hung work surfaces). An attempt is always made to identify the most cost-effective solutions, so several options may be provided to resolve an issue. When options are available, the employee and his/her supervisor are left to select and implement the solution that best meets their needs. Recommendations involving the employee's participation are accompanied by one-on-one training to ensure that the employee has the skills required to carry out the change; for example, adjustments made to a chair are described and demonstrated, and carried out with the employee's participation. Unfortunately, routine follow up is not consistently conducted; if the employee continues to experience discomfort, s/he typically requests a second assessment. At this time, a follow up on the previous assessment is completed. The purpose of this study was to evaluate whether the assessment process is effective in reducing discomfort, by completing follow up on assessments that had been done recently. Optional follow up surveys were sent to employees had participated in office ergonomics assessments within the past year. The survey asked for quantitative estimates of the frequency and severity of discomfort, by body part. For each follow up survey that was submitted, the (non-optional) pre-assessment survey was pulled from the file, and pre-post survey scores were compared. The survey showed significant improvements in discomfort scores for both shoulders, the right wrist, the neck, upper back, and lower back, following the ergonomics assessment. This paper explores the relationship between the workplace improvements and the changes in discomfort scores.

Key words: Office ergonomics, discomfort, survey, pre-post intervention, workplace improvements

**SUIVI D'UNE ANALYSE ERGONOMIQUE AU BUREAU**

**Résumé**

Depuis des décennies, les ergonomes effectuent des analyses ergonomiques au bureau et facilitent le changement. En suivant des pratiques saines, comme celles qui sont décrites dans les lignes directrices de la CSA et dans d'autres rapports de recherche, les ergonomes ont pour postulat que la mise en place d'« améliorations » visant certains postes mène à une réduction de l'inconfort et des risques de blessure. Dans ce document sont examinés les résultats d'une enquête de suivi quantitative. À la suite du processus d'évaluation de la société d'experts-conseils, les employés pour lesquels une évaluation est prévue remplissent

toujours des sondages avant l'évaluation. Le processus d'évaluation comprend un examen du sondage, des entrevues auprès des employés, des observations en milieu de travail, la prise de mesures, des modifications immédiates à la chaise et au poste de travail, des contrôles administratifs auprès des employés (p. ex. usage de la souris avec la main gauche ou pauses plus fréquentes) ainsi que des recommandations de changements supplémentaires en ce qui concerne les achats (p. ex. repose-pieds ou supports à documents) ou les réparations (p. ex. remplacement du vérin de la chaise, ajustements des surfaces de travail à suspension murale). Comme on tente toujours de trouver les solutions les plus économiques, plusieurs options peuvent être suggérées comme solution à un problème. Lorsque les options sont connues, il appartient à l'employé et à son superviseur de choisir et de mettre en application la solution qui répond le mieux à leurs besoins. Les recommandations exigeant la participation de l'employé sont accompagnées d'une formation individuelle qui garantit que l'employé possède les compétences nécessaires pour effectuer le changement; pensons entre autres aux ajustements apportés à une chaise qui sont décrits, montrés et effectués avec la participation de l'employé. Malheureusement, le suivi de routine n'est pas fait avec constance; habituellement, si l'inconfort de l'employé persiste, ce dernier demande une deuxième évaluation. À ce moment, un suivi de l'évaluation précédente est effectué. Le but de la présente étude était de mesurer l'efficacité du processus d'évaluation quant à la réduction de l'inconfort au moyen de la réalisation d'un suivi d'évaluations récentes. Des questionnaires de sondage de suivi optionnel ont été envoyés aux employés qui avaient participé à des évaluations ergonomiques au bureau au cours de la dernière année. On y demandait de fournir des estimations quantitatives de la fréquence et de la gravité de l'inconfort par partie du corps. Pour chaque sondage de suivi qui a été déposé, le sondage antérieur à l'évaluation (non optionnel) a été sorti du dossier, et une comparaison des notes avant et après le sondage a été effectuée. Le sondage a permis de montrer que des améliorations significatives des cotes attribuées à l'inconfort aux épaules, au poignet droit, au cou, au haut du dos et à la région lombaire sont survenues à la suite de l'évaluation ergonomique. Le présent document traite de la relation entre les améliorations apportées au milieu de travail et les modifications des notes d'inconfort.

Mots clés : ergonomie au bureau, inconfort, sondage, intervention avant et après, améliorations du lieu de travail

## **INTRODUCTION**

Previous studies on office ergo intervention effectiveness have isolated individual types of changes (eg. chair adjustments or training), but have not allowed the ergonomist a full range of options to address the risk factors that might be present in an office environment. For example, Amick et al. (2003) studied the effects of providing new chairs plus training on symptoms over the workday, and found that provision of a chair plus training produced a favourable result, while providing training without the adjustable chair did not. Another paper (MacAulay et al., 2009) found a correlation between the ergonomist's opinion regarding whether a change was required, and the presence of discomfort, but did not include follow up to determine whether the improvement in the identified risk factor resulted in a reduction in discomfort. The current study measured discomfort levels before and after intervention, and allowed the employee and ergonomist to evaluate and implement the most effective method of addressing the risks identified. For example, adjustments to existing acceptably-designed chairs would be preferred over providing a replacement chair, whereas replacing a poorly designed or installed keyboard tray would be preferred over adjusting it.

## **METHODS**

Pre-assessment surveys are routinely used to capture baseline discomfort data, as well as to provide information to the ergonomist completing the assessment. The survey asks the employee to rate the frequency and intensity of discomfort, by body part. The survey also asks about employee concerns, ideas for work station improvement, estimates of how time is spent during the work day, software used, telephone usage patterns, laptop use, and vision correction. The survey is sent electronically, via the client Human Resources contact person, to the employee, and is completed prior to the assessment or with the ergonomist during the assessment. The ergonomist reviews the survey results at the beginning of the assessment, and then proceeds to photograph, measure various parameters, adjust the existing equipment, and identify changes or purchases that need to be made. Changes made after the on-site assessment are the responsibility of the employee and company, and a follow up assessment is typically completed only if an outstanding issue is identified.

The types of interventions made varied from person to person, but typically included height adjustments to the seat pan and backrest of the chair, optimisation of keyboard/mouse, work surface, document, and monitor heights and reaches, and provision of foot support (either by adjusting seat pan and work surface heights, or by providing a footrest). Additional recommendations, as appropriate, would address the need for telephone headsets, alternative mouse or keyboard styles, document holders, lighting, or other issues as identified during the assessment process. Adjustments were made with participation of the employee; although formal classroom training was not provided as part of the study, each employee was coached to participate in the adjustments of his/her chair and other adjustability features of the workstation. Following the adjustments, a one-on-one review of appropriate work pacing, work station layout and stretches was conducted with each employee. Each person was left with a marked tape measure which could be used to re-adjust chair and work surface settings, a stretching poster, and a copy of his/her report. The report included a one page summary of all of the assessment parameters and how the ideal work station would look. The report also included a summary of ideal heights for that employee, to be used in the event that s/he moved to a new work station within the company. New equipment, such as chairs and desks, were recommended only if the existing equipment could not be adjusted to meet the employee's needs.

To complete this study, follow up comfort surveys were sent to the Human Resources contact people at twenty-five (25) clients who had contracted the researchers to conduct office ergonomics assessments. The contact people were asked to forward the survey to all employees who had had an assessment done in the past year. Some companies declined the request, although many were very co-operative and eager to support the initiative. The completed follow up surveys were faxed by the employees directly to the researchers, and the pre-assessment survey was then retrieved from the client file and copied for use in the study.

Discomfort scores were calculated for each body part by multiplying the frequency (0, 1, 2, or 3) by the severity (1, 2, or 3). Thus, scores for discomfort could be 0, 1, 2, 3, 4, 6, 8, or 9. Scores were obtained for the eyes, left and right shoulders, left and right elbows, left and right forearms, left and right wrists/hands, neck, upper back, lower back, left and right hips/thighs, left and right knees/feet, and headaches. For each follow up survey that was submitted, the (non-optional) pre-assessment survey was pulled from the file, and pre-post survey scores were compared by a two paired sample Wilcoxon signed rank test.

The follow up survey asked if the proportion of time spent at the computer had changed, and whether all of the recommendations from the report had been implemented. It also asked which changes, in the employee's opinion, had the most significant impact on comfort at work. The survey asked how the ergonomics assessment had influenced quality of work, productivity, or job satisfaction. Finally, the follow up survey asked whether the employee had changed work stations since the assessment, and, if so, whether the ergonomics report was used to set up the new work station.

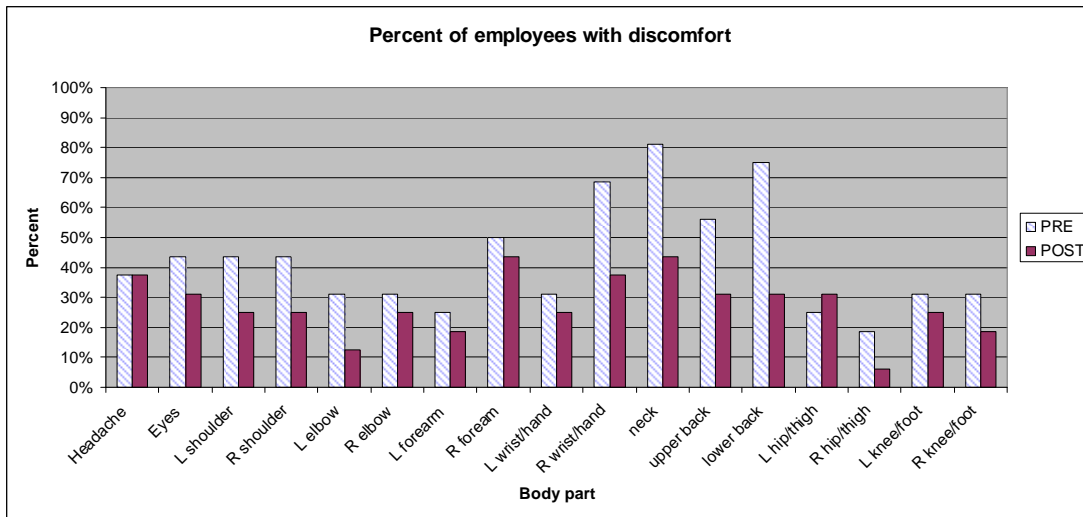
## **RESULTS**

As the follow up surveys were sent to Human Resources contact people and not to employees directly, the actual number of surveys distributed is not known. A few surveys were returned partially completed; these employees were contacted and asked to fully complete the survey and then re-submit it. In the end, 16 completed surveys from 7 different companies were returned and analysed (13 females, 3 males).

All employees indicated that the proportion of time spent performing computer work, paper work, and talking on the telephone had remained unchanged since their initial assessment. Seven out of 16 employees reported switching workstations since their initial assessment, and all indicated that they used the ergonomics reports from their assessment to assist them with setting up their new workstation. Fourteen employees indicated that all recommendations had been implemented, while the remaining two employees reported that most recommendations had been implemented.

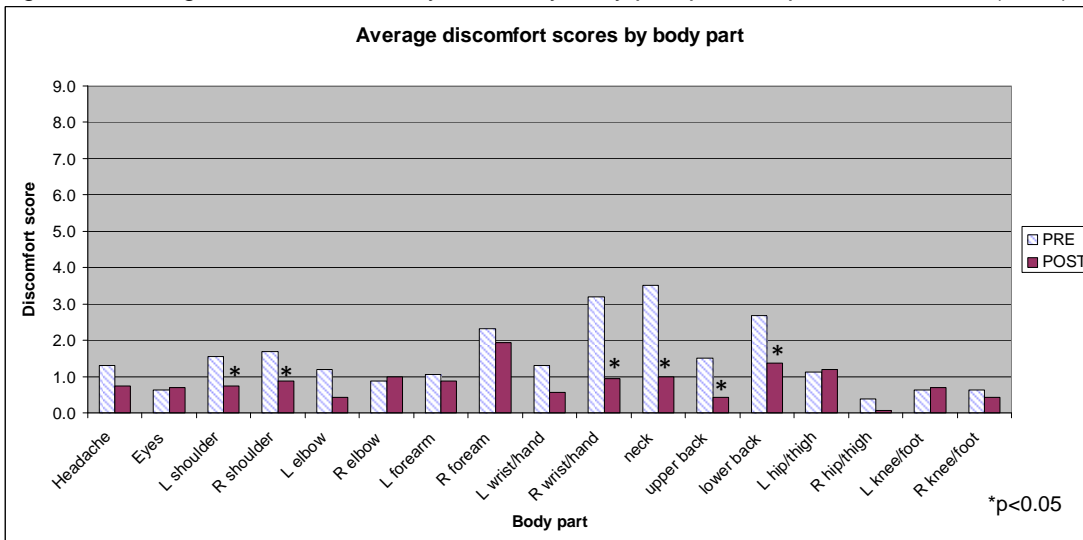
Initially, 0-25% of employees reported left forearm and both hip/thigh discomfort. 26-50% of employees reported discomfort for headaches, eyes, both shoulders, right forearm, left wrist, and both knees/feet. 51-81% of employees reported discomfort for the right wrist, upper back, lower back, and neck. Post-intervention, the number of employees who reported discomfort for all body parts except headaches was reduced. However, while the number of employees with headaches remained the same, the severity of headaches decreased. Figure 1 demonstrates the number of people who reported discomfort for each body part pre and post intervention.

Figure 1: Percent of employees reporting discomfort pre- and post-intervention (n=16)



Discomfort severity decreased for 13 of 17 variables. Discomfort scores were significantly reduced ( $p < 0.05$ ) for both shoulders, right wrist, neck, upper back, and lower back. No significant changes were observed for the eyes, elbows, forearms, left wrist, hips, knees, or headaches.

Figure 2: Average discomfort severity scores by body part pre-and post-intervention (n=16)



## DISCUSSION

The expected improvements in discomfort were found for the shoulders, right wrist, neck, upper back, and lower back, which were the areas where a majority of employees reported discomfort. Trends, although not significant, for most other body parts were in the expected direction. One employee reported a higher eye discomfort rating post-intervention and indicated that this was a result of a recent eye surgery.

Qualitatively, employees had very positive experiences to share. Comments from employees included:

“I feel happier, because I’m not experiencing any pain in my neck or shoulders.”

“I can work for longer durations; allows me to focus.”

“Made me more comfortable. I feel less pain while working.”

“I have little to no discomfort now, when working at my desk.”

## **CONCLUSIONS**

A voluntary follow up survey presents limitations which were evident in this study. The researchers relied on the Human Resources contact person to distribute follow-up surveys; these individuals may not have retained a record of all of the assessments that had been done, and therefore may not have sent follow up surveys to all eligible employees. Similarly, some companies declined to participate, potentially because they were concerned about further issues being raised. The low response rate led to high variance between subjects. Some participants did not complete the follow-up survey correctly and were not able to be contacted; this problem resulted in four surveys that could not be used in the study. For two of the follow up surveys received, the “pre-assessment” surveys were incomplete, resulting in exclusion of two surveys (and a change in our operating procedure to ensure that the practice of using and filing incomplete surveys does not continue).

Ideally, the follow up survey should become part of the assessment process; the follow up survey could be distributed with the final report, along with a request for the employee to submit of the survey after all changes have been implemented. If improvements are observed, the assessment would be deemed to have succeeded. If further issues are identified, a follow up assessment would be warranted.

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