

**An Ergonomic Evaluation and Redesign of Office Workstations
to Decrease Reported Musculoskeletal Discomfort Using an
Internet-Based Office Ergonomics Program.**

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Rational for this Pilot Ergonomics Study of Office Workers

- To control and prevent potential musculoskeletal disorders among office employees, Purdue proposed a research project using an internet-based office ergonomics evaluation tool and a discomfort survey.
- The office ergonomics evaluation tool and discomfort survey were developed by ErgoTrack, (a company located in North Carolina).
- The immediate benefit of a tool like this is to provide quick feedback to the employee about adjusting their workstation. It also provides a record of the evaluation for the administrator.
- The long-term benefit is to have a tool like this for all employees (new, relocated, or those having musculoskeletal problems), to perform self assessments and make adjustments before problems begin.

Methods: Initial Assessment Stage

- 100 office employees volunteered to participate in this study.
- Employees were assisted by Purdue researchers in taking measurements of their workstations. These were entered into Ergotrack.com, which gave immediate feedback based on recommended distances after all measurements were entered.
- All employees completed discomfort surveys.
- Digital photographs of employee workstations were taken at the beginning and end of the evaluations to document workstation changes.
- Adjustments were made at the time of the initial assessment if possible, such as height adjustments to chair dimensions.
- Furniture and equipment, such as keyboard trays, wrist rests, footrests, etc. were ordered when simple adjustments could not be made. Most equipment was received within 2-3 weeks of ordering.

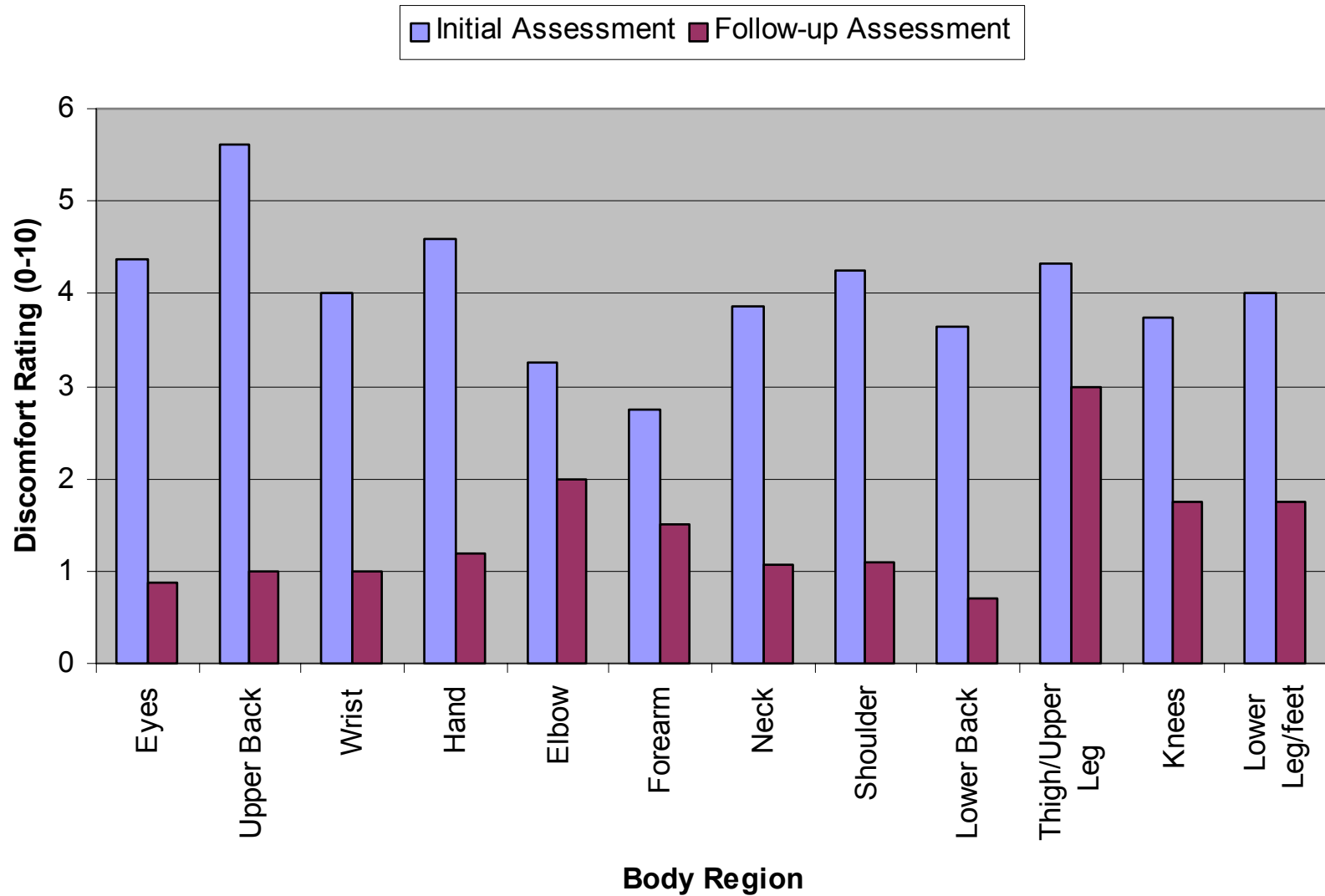
Results: Initial Assessment



- An evaluation at the time of the initial assessment using the ErgoTrack report and observation led to the following findings:
 - the monitor was 7.73 inches higher than recommended;
 - the home row height was 4.5 inches higher than recommended;
 - the chair had no adjustable features and was 1.4” lower than recommended;
 - the computer desk was only 30” wide making it difficult to organize space;
 - and there was glare on the computer screen.

Discomfort Survey Results

Body Region vs. Average Discomfort Rating (N = 28)



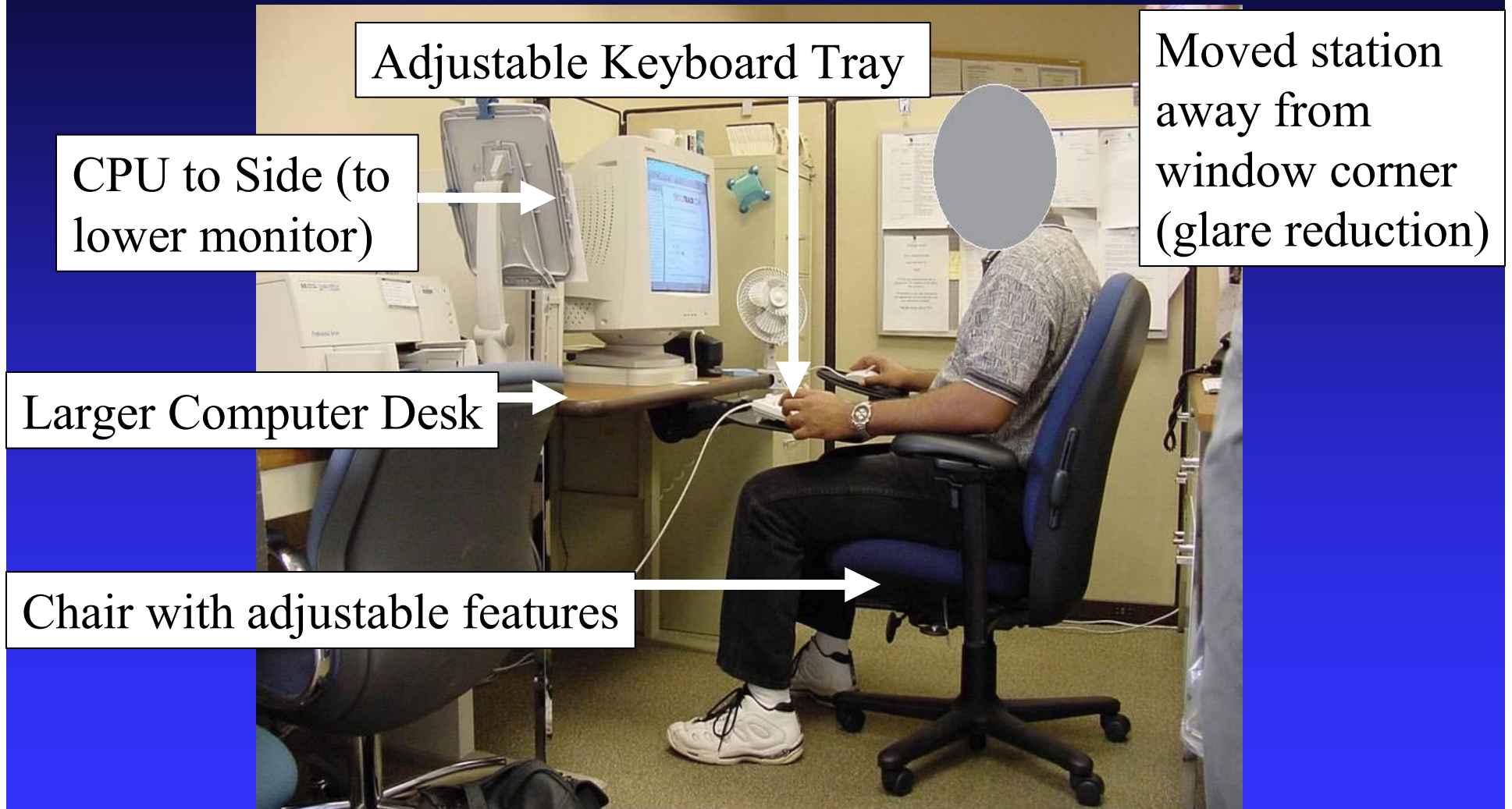
How ErgoTrack Works

- ErgoTrack.com is an internet-based software tool that performs ergonomic assessments of computer workstations.
- Employees take physical measurements of their workstations and enter these data on line into the program. Ergotrack.com compares these measurements to recommended height and reach distances and provides immediate feedback in the form of a report on adjustment recommendations. These distances are based on published anthropometric data.
- A copy of the report with the discomfort survey can be sent to the administrator. These reports can be put into a database like Excel for individual or group evaluation.

Example of a Workstation Evaluation and Redesign Using ErgoTrack.com as an Assessment Tool

- Job Title: Supervisor
- Job Description: Spends 80% of his time at the computer
- Initial Discomfort Survey Results:
 - ◆ Neck (Occasionally, 2)
 - ◆ Shoulder/Upper Arm (Occasionally, 3)
 - ◆ Forearm (Occasionally, 2)
 - ◆ Wrist (Occasionally, 4)
 - ◆ Eyes (Frequently, 4)
 - ◆ Upper Back (Occasionally, 4)
 - ◆ Thigh/Upper Leg (Occasionally, 3)

Results: Follow-Up Assessment



Participant reported no discomfort at the time of the follow-up assessment

Summary of Results Paired t-test Calculations

Statistically Significantly Decreased Discomfort*		Not Statistically Significant Decreased Discomfort*	
Neck	< 0.01	Elbow	0.6
Shoulder	< 0.01	Forearm	0.3
Upper Back	0.03	Thigh/ Upper Leg	0.4
Lower Back	< 0.01	Knee	0.06
Wrist	0.05	Lower Leg/Feet	0.5
Hand	0.04		
Eyes	0.02		

* $\alpha = 0.05$ level

Glare:

My mouse/mouse pad is on a

My footrest is

Measure and round up to the nearest half inch or 0.5"

Frequently Used Shelving Height: [diagram](#)
 (measure from floor to top of shelf surface)

Computer Workstation Height: [diagram](#)

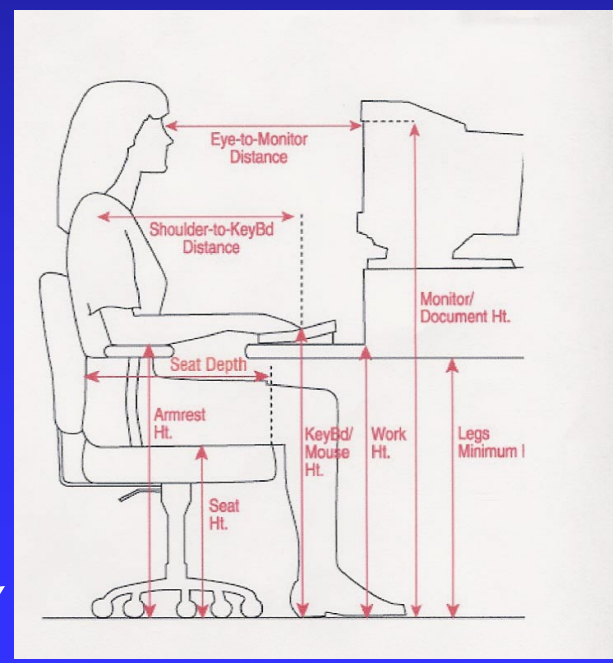
Chair Seat Height: [diagram](#)

Chair Seat Depth: [diagram](#)

Arm Rest Height: [diagram](#)

Keyboard Middle Row Height: [diagram](#)

ErgoTrack pull down menu makes for easy data entry. Also, this screen provides a picture and brief description of the measurement of interest and a measurement schematic.



Methods: Follow up Assessment Stage

- 33 office employees were selected from the group of 100 initial assessment volunteers for follow up assessments at least two weeks after all adjustments were made, using the same procedure as the initial assessments.
- Workers chosen based on:
 - ◆ Severity reported in their discomfort ratings
 - ◆ Greatest need for workstation changes (based on difference between recommended and actual workstation measured values)
 - ◆ Amount of new furniture received or new equipment installed
- 28 of the selected 33 were successfully assessed.
- Discomfort surveys were given again to compare with the initial assessment.

Summary of Discomfort Survey Results: Body Regions

- Out of the employees that originally reported any discomfort in the first assessment, the percent who experienced decreases in discomfort from the follow-up assessment are as follows:

Eyes	87%
Upper Back	71%
Wrist	86%
Hand	80%
Elbow	75%
Forearm	75%

Neck	73%
Shoulder	75%
Lower Back	86%
Thigh/ Upper Leg	33%
Knee	50%
Lower Leg/ Foot	75%

Conclusions

- Out of the 100 employees that were assessed first, 28 employees that were assessed a 2nd time after workstation changes were made. Statistically significant decreases ($\alpha = 0.05$) in reported musculoskeletal discomfort for the hand, wrist, shoulder, elbow, eyes, and upper/lower back body regions were observed.
- Employee feedback on the new ergonomic furniture and equipment was generally positive. Negative feedback received was usually based on problems like equipment not fitting properly in workstation space, conflicts with personal habits, or defects in the new furniture or equipment.
- Only 9 of the 67 employees completed the online follow-up assessment on their own, without the help of a researcher. A supervisor or administrator's may need to provide assistance in assessing employees' computer workstations using this system.