ErgoTools:

Desktop and Mobile Applications for MSD Prevention

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What is an MSD?

- Your body is made up of muscles, tendons, nerves, joints, spinal discs and other tissues. This is the musculoskeletal system.
- When you injure a part of this system as a result of particular workplace hazards it is called a Musculoskeletal Disorder or MSD.

Image Source: Istockphoto.com

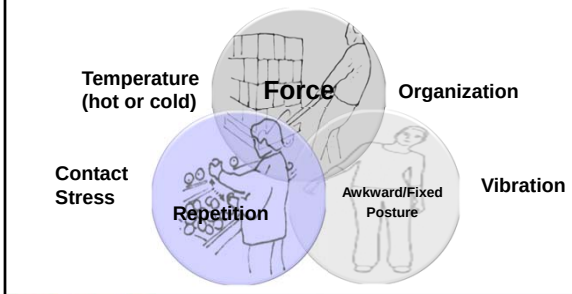
The Most Common Type of Injury in Ontario

- Cost Ontario workplaces $1.2 Billion per year
- MSDs account for 44% of injuries where a worker missed work
- Preventing MSDs means more employees go home healthy and safe at the end of the day

$1.2 Billion

44%

MSD Hazards



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4

Ergonomics Tools

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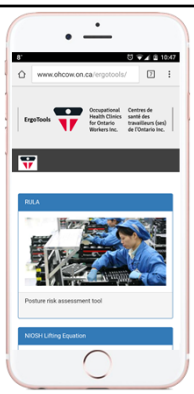
Page 5

Presenting: ErgoTools!

- Combination of 6 commonly used Ergonomics tools
  - RULA
  - ROSA
  - MAE Equation
  - Rohmert Rest Allowance
  - Strain Index
  - NIOSH Lifting Equation
- Works well on desktops, as well as cell phones and tablets
- Give a preliminary idea into if jobs are acceptable for known MSD prevention standards



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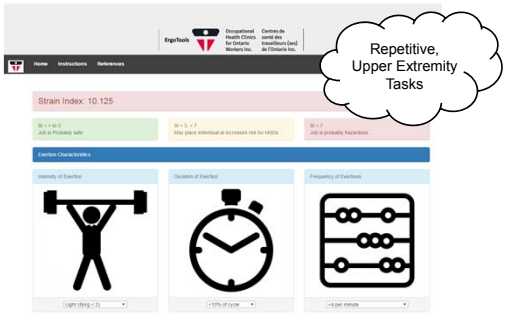
Page 6

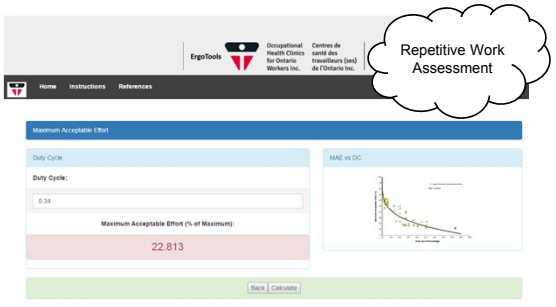
ErgoTools - Use

- Tools require some training – targeted at ergonomists, or JHSC members with ergo training
- Can be used to do screening assessments, and to build a database in your workplace

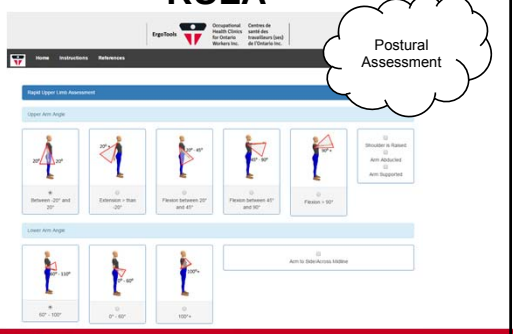
Other Tools – Strain Index



MAE Equation



RULA



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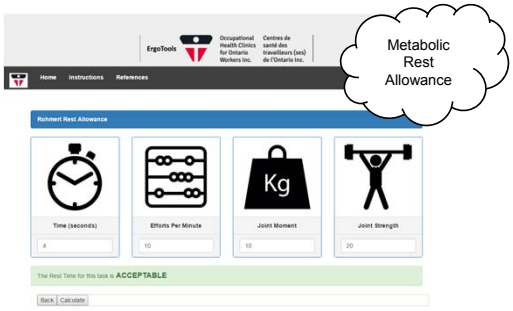
Page 10

Rohmert Rest Allowance



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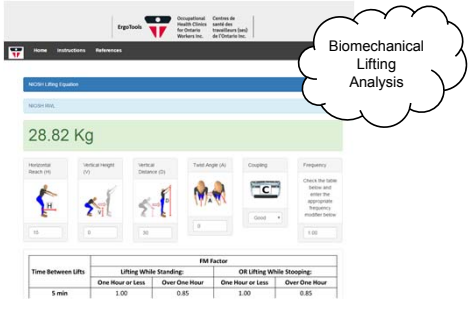
Page 11

NIOSH Lifting Equation



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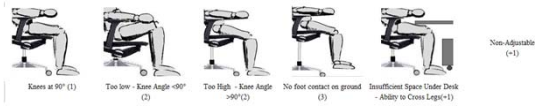
Page 12

ErgoTools - ROSA

- The Rapid Office Strain Assessment – Allows a quick evaluation of the office workstation, provides a 1-10 scale representing risk level (10 is higher)

ROSA - Development

- Risk Factors and ideal postures identified using the CSA Standards on Office Ergonomics (CSA Z412).
- Risk factors and work postures associated with chair, monitor, telephone, keyboard and mouse
  - Risk scores are assigned to each posture and posture combination as they deviate from neutral.



Methods– Tool Development

- An total risk score can be reached (from 1-10) by comparing total chair score vs. Monitor and peripherals score.

ROSA TOTAL SCORE										
		Peripherals and Monitor								
		1	2	3	4	5	6	7	8	9	10
Chair	1	1	2	3	4	5	6	7	8	9	10
	2	2	2	3	4	5	6	7	8	9	10
	3	3	3	3	4	5	6	7	8	9	10
	4	4	4	4	4	5	6	7	8	9	10
	5	5	5	5	5	5	6	7	8	9	10
	6	6	6	6	6	6	6	7	8	9	10
	7	7	7	7	7	7	7	7	8	9	10
	8	8	8	8	8	8	8	8	8	9	10
	9	9	9	9	9	9	9	9	9	9	10
	10	10	10	10	10	10	10	10	10	10	10

Subjects & Procedure

- 72 Office Workers were recruited from a local hospital's administrative staff.
- Each workstation was assessed using ROSA.
- Each worker completed a discomfort questionnaire (Hedge et al., 1999).

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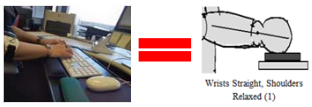
Methods - Procedure

- Inter-rater reliability:
  - 3 Trained observers assessed 14 workstations simultaneously.
- Intra-rater reliability:
  - 3 trained observers assessed workstations once a week for 4 weeks.



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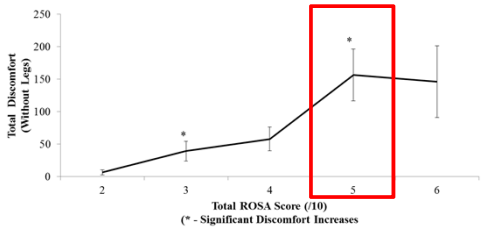
Results

- Inter-rater reliability - ICC=.91 (average)
- Intra-rater reliability - ICC=.88 (average)



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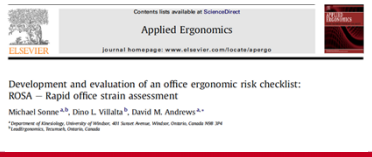
Conclusions

- Using a value of 5 as a cut-off for immediate action may allow professionals to focus on high-risk offices, reducing risk of lost time injuries.


Contents lists available at ScienceDirect

Applied Ergonomics

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Development and evaluation of an office ergonomic risk checklist: ROSA – Rapid office strain assessment

Michael Sonne[a,b], Dino L. Villalta[b], David M. Andrews[a,*]

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Purpose

Experimental Validity Confirmed if:

1. No significant differences between measures
2. Measures were correlated with a magnitude of greater than r=0.5 (Moderate – Vincent, 1999)

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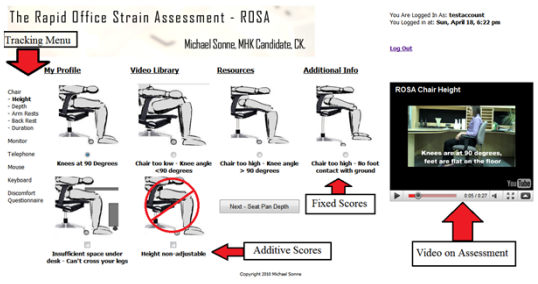
Methods



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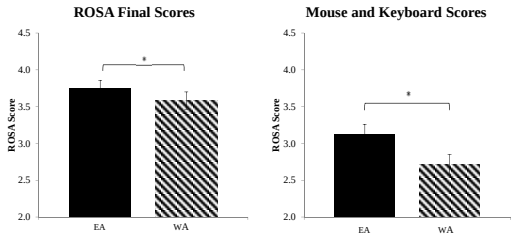
Results – Assessment Type



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Results – Assessment Type

- No main effect seen for Assessment Type in the Chair, or Monitor and Telephone subsection
  - Chair
    - EA = mean 3.36 (SE(0.12)), WA = 3.02 (0.13)
  - Monitor and Telephone
    - EA = 2.74(0.16), WA = 2.54(0.15)

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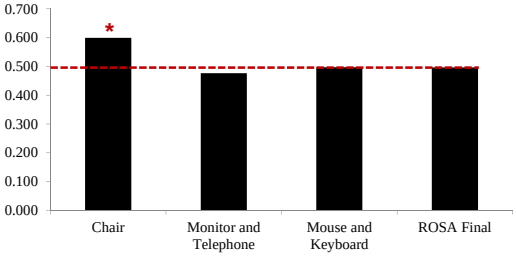
Results – Assessment Type

- Correlations between WA and EA



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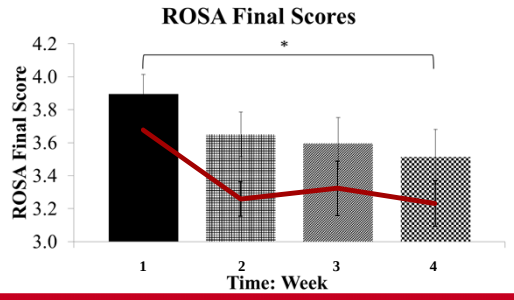
Correlation "Validity" – r < 0.5

Results



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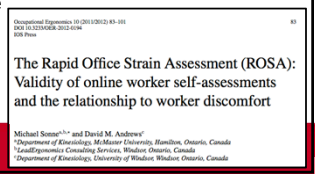
Conclusions

- Observer-reported ROSA final scores require additional study
  - Observer-reported ROSA scores from chair met the experimental definition of Validity
  - Correlation strength increased from Week 1 to 4 in Mouse and Keyboard and ROSA final section
- Feedback had a detrimental effect on worker assessment performance


Occupational Ergonomics 10 (2011/2012) 83–101
DOI 10.3233/OER-2012-0194
IOS Press

The Rapid Office Strain Assessment (ROSA): Validity of online worker self-assessments and the relationship to worker discomfort

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[b]LeadErgonomics Consulting Services, Windsor, Ontario, Canada
[c]Department of Kinesiology, University of Windsor, Windsor, Ontario, Canada

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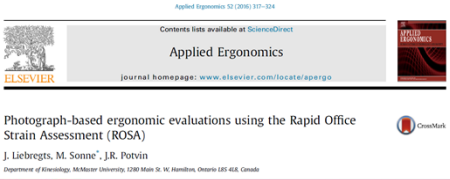
Other Methods for ROSA

- Research Question: Is photo-analysis a valid method of office workstation risk factor assessments using ROSA?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Photograph-based ergonomic evaluations using the Rapid Office Strain Assessment (ROSA)

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Methods

Photographs:

Fig. 2. Fully inclusive sagittal photo – trunk, seat properties, upper limb, neck, equipment orientation

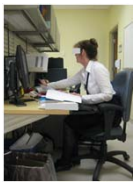

Fig. 3. Sagittal photo capturing reach for telephone

Fig. 4. Coronal photo showing upper limb postures while typing, neck rotation

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Methods

Photographs:

Fig. 5. Photo capturing the workstation operator's phone usage

Fig. 6. Coronal photo depicting upper limb postures while mousing

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Results

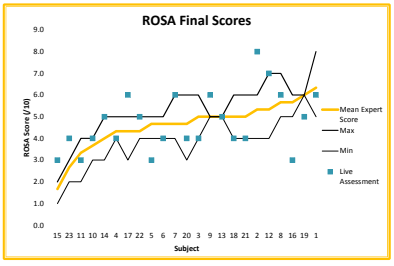

Fig. 7. Overall relationship between live assessments and photo-observer scores

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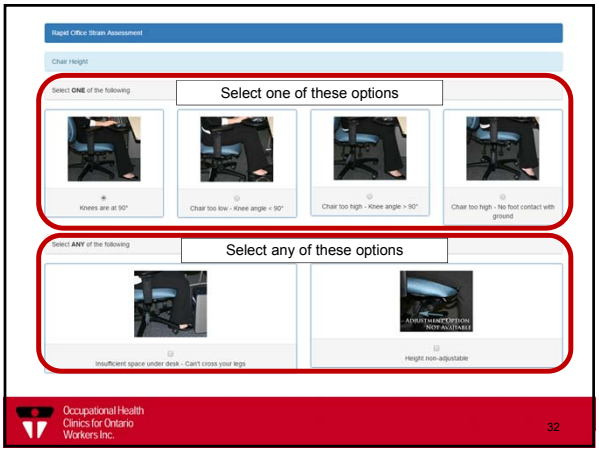
2004
2006
2008
2010
2014
2016
Future


Rapid Office Strain Assessment
Chair Height
Select ONE of the following
Select one of these options
Knees are at 90°
Chair too low - Knee angle < 90°
Chair too high - Knee angle > 90°
Chair too high - No foot contact with ground
Select ANY of the following
Select any of these options
Insufficient space under desk - Can't cross your legs
Height non-adjustable
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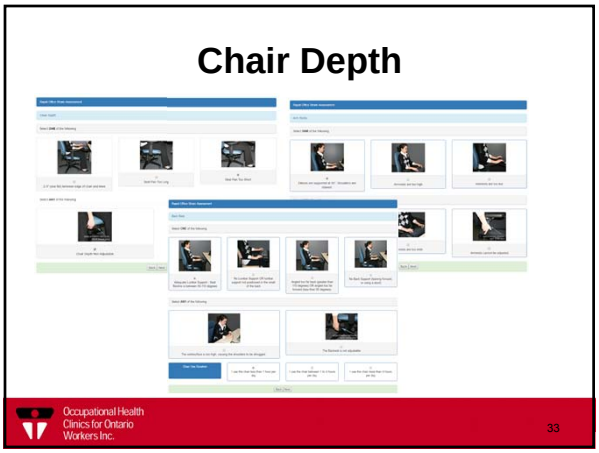
32


Chair Depth
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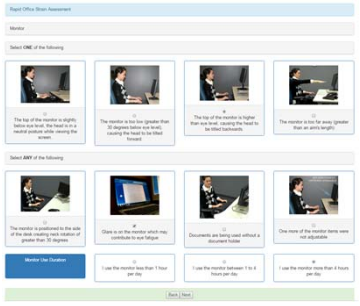
33

Monitor



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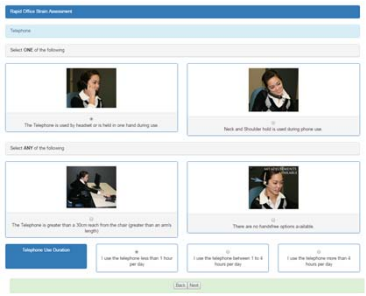
34

Telephone



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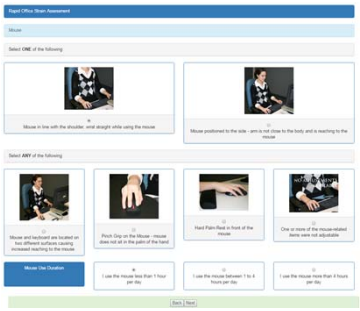
35

Mouse



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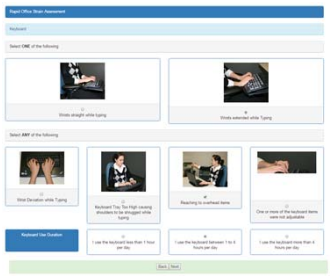
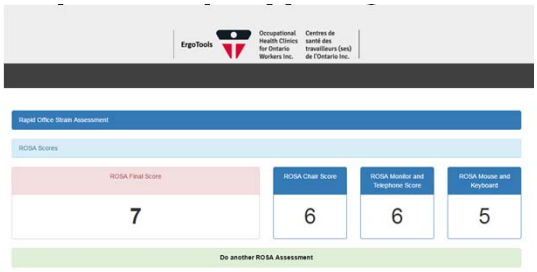
36

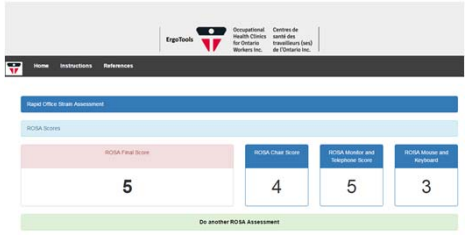
Keyboard



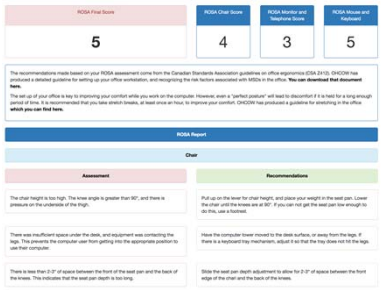


ErgoTools - ROSA

- Scores of 5 or greater – ↑ Discomfort
- Have an Ergonomics Assessment completed



ROSA - Reporting



ROSA Final Score	ROSA Chair Score	ROSA Monitor and Telephone Score	ROSA Mouse and Keyboard
5	4	3	5

The recommendations made based on your ROSA assessment come from the Canadian Standards Association guidelines on office ergonomics (CSA Z412). OHCOW has produced a detailed guideline for setting up your office workstation, and recognizing the risk factors associated with MSDs in the office. **You can download that document here.**

The set-up of your office is key to improving your comfort while you work on the computer. However, even a "perfect posture" will lead to discomfort if it is held for a long enough period of time. It is recommended that you take stretch breaks, at least once an hour, to improve your comfort. OHCOW has produced a guideline for stretching in the office **which you can find here.**

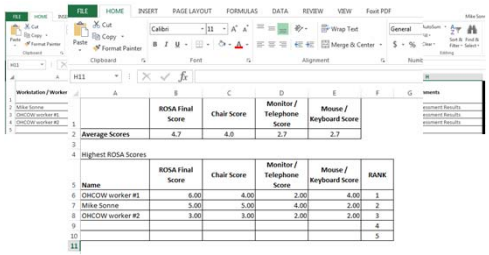
ROSA Report

Chair

Assessment	Recommendations
The chair height is too high. The knee angle is greater than 90°, and there is pressure on the underside of the thigh.	Pull up on the lever for chair height, and place your weight in the seat pan. Lower the chair until the knees are at 90°. If you can not get the seat pan low enough to do this, use a footrest.
There was insufficient space under the desk, and equipment was contacting the legs. This prevents the computer user from getting into the appropriate position to use their computer.	Have the computer tower moved to the desk surface, or away from the legs. If there is a keyboard tray mechanism, adjust it so that the tray does not hit the legs.
There is less than 2-3" of space between the front of the seat pan and the back of the knees. This indicates that the seat pan depth is too long.	Slide the seat pan depth adjustment to allow for 2-3" of space between the front edge of the chair and the back of the knees.

ErgoTools – ROSA

- Excel Worksheet

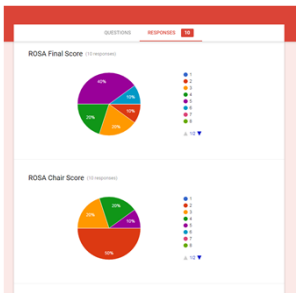


	ROSA Final Score	Chair Score	Monitor / Telephone Score	Mouse / Keyboard Score
Average Scores	4.7	4.0	2.7	2.7

Highest ROSA Scores

Name	ROSA Final Score	Chair Score	Monitor / Telephone Score	Mouse / Keyboard Score	RANK
OHCOW worker #1	6.00	4.00	2.00	4.00	1
Mike Sonne	5.00	5.00	4.00	2.00	2
OHCOW worker #2	3.00	3.00	2.00	2.00	3
					4
					5

ROSA Results



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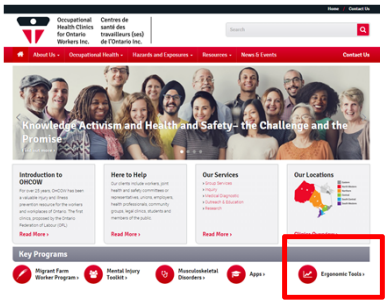

OHCOW - ErgoTools

- www.ohcow.on.ca/ergotools
  - Mike Sonne, PhD, CCPE
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- Thanks!