To Sit or Not to Sit...What Does the Research Say?

Elizabeth Chapman, R.Kin.
Registered Kinesiologist/Business Development Manager Canada

WSPS Regional Conference – Ottawa
Overview

• What is “Sitting Disease”?
• What does the research say about
  • Sitting/Not Sitting
  • Types of desks
• What types of desks are out there? What to look for?
• Software options
• Alternatives for a healthy workforce
What is Sitting Disease

• The World Health Organization (WHO) places physical inactivity as the fourth-leading risk factor for global mortality, causing an estimated 3.2 million deaths annually worldwide. It ranks behind high blood pressure, tobacco use and elevated blood glucose levels and ahead of both obesity and high cholesterol, and it could be argued that all of these risks, minus tobacco use, potentially are tied to a lack of physical activity.
What is Sitting Disease?

“Sitting Disease” by the numbers

Our modern sedentary lifestyles, both at home and in the workplace, are costly for us and for our employers.

Average hours of seated commute + average hours of seated homelife = too much sitting!

A 2008 Vanderbilt University study of 6,300 people published in the American Journal of Epidemiology estimated that the average American spends 88% of waking time (7.7 hours per day) in sedentary behaviors such as sitting.
What is Sitting Disease?

- 50 to 70 percent of people spend six or more hours sitting a day
- 20 to 35 percent spend four or more hours a day watching TV

Reference: Mayo Clinic
Occupational Physical Activity Questionnaire (OPAQ)

1. How many hours per week do you usually work in your primary job? Hours/Week __40__ Don’t know _____

2. In a usual week, do you perform any sitting or standing doing work such as using a computer, desk work, using hand tools, light assembly, lab tech, or driving a car or truck while at work?
   Yes _X__ or No ______ if no go to #4

3. In a usual week, how many hours do you do these sitting or standing activities at work? Hours/week __32__ Don’t know____

4. In a usual week, do you perform any walking at work as in the halls, between buildings, or in jobs like a postal carrier, waiter, or roving salesperson? Yes _X___ No _____ if no go to #6
5. In a usual week, how many hours do you walk at work?
   Hours/week _8_ Don’t know ____
6. In a usual week, do you perform an heavy labour or use power tools during work such as moving furniture, carpentry, jackhammers, or using a shovel or pick?
   Yes _____ No____X____ if no then quit
7. In a usual week, how many hours do you perform these heavy labour activities at work?
   Hours/week _N/A___ Don’t know ____
What is the Problem with Sitting?

- Compared to people who sit minimally during the day, longtime sitters have:
  - 112% increased risk of developing diabetes
  - 147% increased risk of having a heart attack or stroke, coupled with a 90% chance of dying from such an event.
  - 49% increased risk of dying prematurely.

Reference: Wilmot et al, 2012
What is the Problem with Sitting?

- Studies suggest that compensation for time spent sitting cannot be achieved by meeting or even exceeding the current physical activity guidelines.

What Are Your Options?

- Static Workstations
  - Sitting
    - Chair
    - Stability ball
  - Standing
  - Sitting/Standing/Other
- Active Workstations
  - Treadmill
  - Recumbent Bike
Sitting Workstations
Sitting Workstations
Stability Ball Chairs

• Does not greatly alter how you sit
• Many studies show reported increased discomfort using stability ball as chair

Reference: Gregory et al, 2006
Standing Workstations
## Pros and Cons of Standing

<table>
<thead>
<tr>
<th>Cons</th>
<th>Pros</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased fatigue, leg muscle pain, and low back pain</td>
<td>2 hours of standing with 5 minute seated breaks every hour did not cause fatigue</td>
</tr>
<tr>
<td>Damaged knee cartilage in women</td>
<td>After 5 hours of standing, it takes 30 minutes of seated recovery to relieve symptoms</td>
</tr>
<tr>
<td>Ankle/foot musculoskeletal issues</td>
<td>Improved glucose levels</td>
</tr>
<tr>
<td>Swelling of the feet</td>
<td>Heart rate more elevated than when sitting</td>
</tr>
<tr>
<td>Affects postural control</td>
<td>Slight increase in energy expenditure</td>
</tr>
<tr>
<td></td>
<td>Improvements in mood states</td>
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</table>

Alternative Static Workstations
Alternative Static Workstations
Do Sit/Stand Desks Reduce Sitting Time?

- Sit/Stand Desks
  - ↓ sitting by ½ to 2 hours/day
  - Combined with info and counselling – no change
  - ↓ total sitting time inside and outside work
  - ↓ duration of sitting episodes > 30 minutes

Reference: Cochrane systematic review, 2016
What are the Performance Issues with Standing

• Standing affects performance at smaller button sizes (<20 mm). For participants with and without motor-control disabilities, standing led to greater exerted force and impulse.

Reference – Chourasia et al, 2012
Sit, Stand & Perch Option

- Perching – forward slope of seat pan - ↑ lordosis which decreases spinal loads
- Allows for more motion than sitting
- Perching workstation represents reasonable trade off between sitting and standing
- May assist with reducing spinal loads and discomfort from standing

Reference – Le and Marras, 2016
Other Benefits of Sit/Stand Desks

- Helpful for those with musculoskeletal issues:
  - Neck
  - Back
  - Hips
Active Workstations
Active Workstations to Fight Sedentary Behaviour

• Implementation of active workstations has major positive influences on health-related aspects:
  • energy expenditure,
  • fat percentage,
  • waist circumference,
  • HDL, etc.,
• Could possibly contribute to improving people’s health and physical activity levels and to decreasing their time spent sitting (not bike desks)

Reference: Torbeyns et al, 2014
**Effects on Performance**

- Computer task performance was lower when walking and slightly lower when cycling, compared with chair sitting.
- Mouse related tasks are affected.
- Mixed results related to typing and speed of treadmill (Use a self-selected speed 1.6 - 3.2 km/h is ideal in optimizing typing and mouse performance).
- Transcription speed is negatively affected.
- Does not lower cognitive functions.
- Minor loss in work performance over the first 3–5 months but found that performance after one year exceeded baseline.

## Standing vs. Treadmill

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Standing Desk</th>
<th>Treadmill Desk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physiological</td>
<td>Increased energy expenditure</td>
<td>Higher energy expenditure than standing desks</td>
</tr>
<tr>
<td></td>
<td>Increase HR and BP</td>
<td>Increase HR and decrease BP</td>
</tr>
<tr>
<td>Weight Management</td>
<td>May be a useful tool for both obese and non-obese</td>
<td>May be a useful tool for both obese and non-obese</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduces waist circumference</td>
</tr>
</tbody>
</table>

# Standing vs. Treadmill

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<th>Treadmill Desk</th>
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<tr>
<td>Metabolic</td>
<td>↑HDL Mixed results for glucose management</td>
<td>↓LDL &amp; ↑HDL Improved glycemic control</td>
</tr>
<tr>
<td>Psychological</td>
<td>no decrease in work performance over time ↓ in work stress, discomfort and psychological strain, ↑ in productivity greater worker satisfaction and quality of life Same cognitive performance</td>
<td>a decrease in typing and mouse performance was shown with its use – but eliminated with learning effect Same cognitive performance</td>
</tr>
</tbody>
</table>
Perception of Treadmill Desks

- Fell less stressed
- Breaks up the day
- Not too noisy
- Don’t feel affects productivity
- Mixed responses related to feeling fatigued
- Less back pain
- Diminished fine motor coordination
- Perception of increased need for concentration

Reference: Tudor-Locke et al, 2014
Perception of Pedal/Bike Desks

- Users feel device easy to use, did not affect productivity or quality of work
- Improvement in need for balance and producing upper arm movement
- 95.6% preferred to be used at their own desks
- On average used 31 mins/day
- Compliance to use is low

Reference: Tudor-Locke et al, 2014
Active Work Stations - Considerations

- Active workstations are expensive (need to be able to operate for long times at slow speeds)
- Expense limits widespread use (shared workstations an option)
- Large footprint
- Lack of portability
- Doesn’t eliminate need for seated work space
- Can’t be used by everyone (increases heart rate)
- Access and cost of electricity
- Noise/disruption to neighbours
- Need for appropriate footwear
- Risk of tripping/falling
- Maintenance

Reference: Tudor-Locke et al, 2014
Micro Break Time
5 Minute Break - Let’s Try Some Desks!

Thank you to the following companies for their desks:

http://ca.varidesk.com/

http://www.ergotron.com/

http://oristand.co/
Tips for Buying

- Analysis of work area and recommendation for appropriate equipment (watch out for corners and shelves)
- What is the cost?
- Education on use and benefits important
- Needs to be easy to use
- Office ergonomic principles still need to be followed:
  - Monitor height and distance
  - Keyboard/mouse height (drop keyboard)
  - Adjustable
- Who is using the desk (i.e. shared)?
- Space consideration in product feature assessment
- Need appropriate foot wear
<table>
<thead>
<tr>
<th>Keyboard &amp; Monitor Height Calculator</th>
<th>Seated Elbow Range</th>
<th>Standing Elbow Height Range</th>
<th>Seated Eye Height Range</th>
<th>Standing Eye Height Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>5'0&quot;</td>
<td>21.9&quot;</td>
<td>36.5&quot;</td>
<td>42&quot;</td>
<td>55.7&quot;</td>
</tr>
<tr>
<td>5'1&quot;</td>
<td>22.3&quot;</td>
<td>37.1&quot;</td>
<td>42.5&quot;</td>
<td>56.6&quot;</td>
</tr>
<tr>
<td>5'2&quot;</td>
<td>22.6&quot;</td>
<td>37.8&quot;</td>
<td>43&quot;</td>
<td>57.6&quot;</td>
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<tr>
<td>5'3&quot;</td>
<td>22.9&quot;</td>
<td>38.2&quot;</td>
<td>43.3&quot;</td>
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<tr>
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<td>39.6&quot;</td>
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<td>60.4&quot;</td>
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<tr>
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<td>65.4&quot;</td>
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<tr>
<td>6'5&quot;</td>
<td>33.7</td>
<td>49.2&quot;</td>
<td>55.3&quot;</td>
<td>71.0&quot;</td>
</tr>
</tbody>
</table>

* This data represents an average that includes female & male anthropometric dimensions. The population variety can result in dimensions being off by an inch or two.

Recommendations on Use

- Start small
- Listen to your body
- Wear appropriate clothing and shoes
- Keep a log to see progress
- Use software for reminders
Software Options

- Workrave (no cost)  [http://www.workrave.org/](http://www.workrave.org/)
Software Options

- Varidesk App (no cost)
Software options

- DeskActive (cost) [http://www.deskactive.com/](http://www.deskactive.com/)
- Workspace (cost)
  [http://www.wellnomics.com/workpace/about/what-is-workpace/](http://www.wellnomics.com/workpace/about/what-is-workpace/)
- Fitbit – if no activity after a certain period of time it buzzes
Effects of Some Other Options

- Walking Breaks
  - Did not change sitting time
- Information and Counselling
  - ↓ sitting time by 28 mins
  - Mindfulness training – no change
- Computer prompting
  - Some studies found reduction in sitting (55 mins and 14 mins)

Reference: Cochrane systematic review, 2016
Other Options

- According to her research, sedentary individuals need to stand up around 35 times per day to counteract the toll sitting takes. And these standing actions need to be spread out as equally as possible throughout the day to maximize the benefit. Going from sitting to standing 35 times all at once offers a small percent of the upside that standing once every 20 minutes provides.

- Reference: Dr. Joan Vernikos, the former director of the National Aeronautics and Space Administration's (NASA's) Life Sciences Division and author of Sitting Kills, Moving Heals
Other Options

- Organizational policies to support movement
- Move printers/copiers away from desk areas
- Place break/lunch rooms farther away
- Walk and talk to co-worker rather than e-mailing
- Stand up/walk to talk on phone (wireless headset)
- Stand and use tall cabinet to read/write
- Use treadmill for listening to webinars
- Increase water intake throughout day
- Schedule walking meetings (2-3 people)
- Wellness competitions and other activities to encourage movement
Reduce meeting times by 79%
Take Away Messages

- Too much of anything is bad!
- More research is needed related to alternative workstations
- Evidence that less sitting and more movement is beneficial
- Get active at work and at home – 150 mins moderate to vigorous activity/week
- Follow ergonomic principles when purchasing office furniture
Thank you!

Elizabeth Chapman R.Kin
Registered Kinesiologist
BTE Technologies
echapman@btetech.com
1-800-206-2972 X161