

Free Resources for Ergonomic Analyses from the National Institute for Occupational Safety and Health (NIOSH)

Marie Hayden

CDC-National Institute for Occupational Safety and Health

Corresponding author's Email: MHayden@cdc.gov

Author Note: This work was supported in part by a research fellowship at the Centers for Disease Control and Prevention, NIOSH administered by the Oak Ridge Institute for Science and Education, through an interagency agreement between the U.S. Department of Energy and the Centers for Disease Control and Prevention.

Abstract: The National Institute for Occupational Safety and Health (NIOSH) has published many resources for analyzing safety and health concerns at work sites. These resources range from traditional publications, such as workplace solutions, to mobile applications, webpages, and blogs. One example is the 1997 publication *Elements of Ergonomics Programs* that was updated in 2017 as a new web version that has more recent content and current online assessment tools. Similarly, the Revised NIOSH Lifting Equation manual now has a mobile application for lifting task analysis. Other available mobile applications include ErgoMine, Ladder Safety, NIOSH Sound Level Meter, Centers for Disease Control (CDC)-NIOSH Pocket Guide to Chemical Hazards and the Occupational Safety and Health Administration (OSHA)-NIOSH Heat Index. Updated webpages such as the NIOSH National Occupational Research Agenda (NORA) sector program, cross sector and core specialty program pages provide information on current research and useful resources. This presentation will review several of the free NIOSH publications and resources analyzing musculoskeletal related safety and health, as well as discuss information on program portfolio pages such as the Musculoskeletal Health Program Portfolio page.

Keywords: Ergonomics, Musculoskeletal Health

1. Introduction

NIOSH resources available to the public include alerts, criteria documents, current intelligence bulletins, engineering and physical hazards reports, fact sheets, impact sheets, joint NIOSH/Occupational Safety and Health Administration (OSHA) publications, firefighter fatality investigation reports, Fatality Assessment and Control Evaluation reports (FACE), hazards controls, hazard identifications, Health Hazard Evaluation reports (HHE), mining publications, program performance one-pagers, worker health study summaries and workplace solutions (NIOSH, 2017). This presentation focuses on publications and webpages specifically about musculoskeletal health-related research and demonstrates mobile applications related to human factor and ergonomics. Both the publications/webpages and mobile applications would benefit private and public industries' (e.g. construction, manufacturing, mining, public service, etc.) employers, and employees (occupational safety and health professionals, management, researchers, etc.) by increasing awareness of ergonomics, encouraging analysis, and recommending safety and health solutions in the work environment.

1.1 Publications and Webpages

Well-known NIOSH publications that focus on musculoskeletal health include the *Elements of Ergonomics Programs*, the *Applications Manual for the Revised NIOSH Lifting Equation*, and *Observation-Based Posture Assessment: Review of Current Practice and Recommendations for Improvement*. Cohen, Gjessing, Fine, Benard & McGlothlin (1997) developed the *Elements of Ergonomics Programs* to provide basic information on how to design effective programs for the prevention of work-related musculoskeletal disorders. To incorporate current information into the already published *Elements of Ergonomics Programs*, a new web-based version was released in 2017, that includes current exposure charts from the National Health Interview Survey (NHIS) Occupational Health Supplement and links to different assessment checklists and tools (i.e. workstation checklist, material handling checklist, Rapid Entire Body Assessment (REBA) tool, Rapid Upper Limb Assessment (RULA) tool, etc.) (Elements of Ergonomics, 2017). Waters, Putz-Anderson, and Garg (1994) developed the application manual to apply the Revised NIOSH Lifting Equation to job related tasks. This manual is the foundation for the recent Mobile

Application, the NLE Calculation. Lowe, Weir, Andrews (2014) discuss recommendations for observation-based posture assessments to improve risk analysis for prevention of musculoskeletal disorders caused by stress on the trunk and upper limbs.

The NIOSH Musculoskeletal Health Program Portfolio webpages provide links to information on the current burden, need, and impact of musculoskeletal disorders on worker's safety and health. It also, links to the NIOSH Ergonomics and Musculoskeletal Disorders topic pages, which lists available journal articles, publications, and mobile applications (Musculoskeletal Health, 2018). Several related NIOSH Science Blogs also disseminate general information on ergonomics, musculoskeletal disorders, safety, etc. and include references to other resources (NIOSH Science Blogs, 2008-2018).

1.2 Mobile Applications

NIOSH has developed several mobile applications, to allow a worker or safety professional to quickly assess various safety and health concerns at a work site. For example, the NIOSH Lifting Equation (NLE) Calculator is designed to differentiate safe from unsafe lifting tasks, by allowing the user to enter-task measurements (horizontal, vertical, and distance location, load weight, angle, frequency, duration, and coupling) to calculate the lifting index at a specified moment (NIOSH Lifting, 2017). ErgoMine contains an ergonomics audit for bagging, haul truck, and maintenance and repair operations tasks performed in mining operations (Mining Product, 2017). The NIOSH Ladder Safety app is designed to allow users to quickly measure the angle of a ladder setup and has features based on the American National Standards Institute (ANSI) A14 to decide, select, inspect, setup, properly use and add accessories to a ladder (Falls in the Workplace, 2018). The NIOSH Sound Level Meter app is designed to measure noise exposure and "raises workers' awareness about their work environment" (Noise and Hearing, 2018). The OSHA-NIOSH Heat Index app is designed to quickly evaluate heat stress exposure at the current location, with possible results ranging from 'minimal risk' to 'extreme risk' (OSHA-NIOSH, 2017). This app also provides hourly information, symptoms (e.g. heat stroke, heat exhaustion), and first aid resources. The CDC-NIOSH Pocket Guide to Chemical Hazards is designed to provide mobile information on the chemical such as trade names, NIOSH recommended exposure level (REL), OSHA permissible exposure level (PEL), and similar information on a safety data sheet (NIOSH Pocket Guide, 2016).

2. Citations and References

Cohen, A.L., Gjessing, C.C., Fine, L.J., Bernard, B.P., McGlothlin, J.D. (1997). Elements of Ergonomics Programs: A primer based on workplace evaluation of musculoskeletal disorders. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 97-117.

Lowe, B. D., Weir, P. L., & Andrews, D. M., (2014). Observation-Based Posture Assessment: Review of Current Practice and Recommendations for Improvement. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2014-131.

Elements of Ergonomics Programs: Ergonomics Primer. (2017, July). Retrieved from:
<https://www.cdc.gov/niosh/topics/ergonomics/ergoprimer/default.html>

Ergonomics and Musculoskeletal Disorders. (2018, March). Retrieved from: <https://www.cdc.gov/niosh/topics/ergonomics/>

Falls in the Workplace: NIOSH Ladder Safety App. (2018, April). Retrieved from:
<https://www.cdc.gov/niosh/topics/falls/mobileapp.html>

Mining Product: ErgoMine. (2017, July). Retrieved from: <https://www.cdc.gov/niosh/mining/works/coversheet1906.html>

Musculoskeletal Health Program. (2018, February). Retrieved from: <https://www.cdc.gov/niosh/programs/msd/default.html>

NIOSH Lifting Equation App: NLE Calc. (2017, September). Retrieved from:
<https://www.cdc.gov/niosh/topics/ergonomics/nlecalc.html>

NIOSH Science Blogs Posts. (2008-2018). Retrieved from: <https://blogs.cdc.gov/niosh-science-blog/>

Noise and Hearing Loss Prevention: NIOSH Sound Level Meter App. (2018, February). Retrieved from:
<https://www.cdc.gov/niosh/topics/noise/app.html>

NIOSH Pocket Guide to Chemical Hazards Mobile Web Application. (2016, August). Retrieved from:
<https://www.cdc.gov/niosh/npg/mobilepocketguide.html>

OSHA-NIOSH Heat Safety Tool App. (2017, April). Retrieved from:
<https://www.cdc.gov/niosh/topics/heatstress/heatapp.html>

Waters, T.R., Putz-Anderson, V., & Garg, A., (1994). Applications manual for the revised NIOSH lifting equation. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-110.