

Ergonomics Risk Assessment: Determining When, Why, and How You Should Perform One

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Introduction

As ergonomics increasingly becomes a core component of safety programs around the country the methods used to evaluate and define the ergonomics risk present in a job develop into a critical element of the ergonomics process. When a company begins to look at ergonomics and how to implement an effective process, the basic job analysis is often the starting point, and the point that defines how a company will approach the analysis and abatement of ergonomics risk.

Identification of ergonomics stressors that are linked with the development of musculoskeletal disorders is a key element of any ergonomics activity. In most cases, stressors can be successfully identified using observational and checklist driven techniques; the detection of ergonomics risk does not require advanced tools or techniques. This observational approach is often the most efficient method of gathering data on the stressors in the working environment, but the density of this data is limited. There is no measure of exposure, risk, or any data that will provide a quantitative measure that can be tracked (i.e. improvement of process). The positive characteristics of this type of stressor identification process are the ease of which it is performed, the low cost of the assessment, and quick turnaround times. A simple observation approach can often be used to feed a quick fix of an obvious ergonomics stressor. As the situation becomes more complicated, intricate, or costly, the need for a more sophisticated approach may present itself.

When a company is interested in advancing its ergonomics job analysis process, the next level of assessment involves the use of risk assessment tools. Now, the term tool is used lightly, in that ergonomics risk assessment methods are largely paper-based, with some methods computerized for ease of use. There are seldom any complicated pieces of equipment involved, except for a force gauge in some situations. Prior to using an ergonomics risk assessment tool a company should ask four simple questions:

1. Why should we use an ergonomics risk assessment tool?

2. Who will be performing the assessments?
3. How do we use the risk assessment tool correctly?
4. When should we use a specific ergonomics risk assessment tool?

This paper will walk through these four questions to provide a guide to adding ergonomics risk assessments to a safety or ergonomics program.

Why and When Should You Perform an Ergonomics Risk Assessment?

Where ergonomics is concerned, there are often three questions asked:

- Which jobs pose the greatest risk?
- How much is too much?
- How can I show improvements were made?

One of the first steps in ergonomics evaluations is to identify the stressors present in the jobs. This identification is usually accomplished with a subjective evaluation. The evaluator may identify such things as high repetition, high force, and/or extreme posture as being present in a job without any measurements. While this type of evaluation may be effective for determining which jobs may need further investigation, the severity of the identified stressors is often difficult to express and/or document. Furthermore, it is difficult to compare different jobs or tasks within a job to determine a prioritization of ergonomics efforts. This leads to the question: “Which jobs pose the greatest risk?”

Ergonomic interventions may not completely eliminate the stressors. They may be reduced but still be present. Additionally, as long as humans are involved in the workplace there will be ergonomic stressors placed on those individuals. Therein lays the question: “How much is too much?”

Some interventions may address a stressor identified in the original evaluation and create another stressor. Therefore, once interventions are in place they should be evaluated to ensure they eliminated or reduced the stressors identified in the original evaluation without creating another hazard. This begs the question: “How can improvements be shown and evaluated?”

Some answers to these questions may be found through the use of ergonomics risk assessment tools. The use of quantitative or semi-quantitative evaluation tools provides the evaluator with numeric output with which they may evaluate the risk for the development of MSDs for a given job. This output may also allow them to compare relative risk of multiple jobs or tasks, thereby identifying the jobs or tasks that pose the greatest risk. This may assist the evaluator in the prioritization of ergonomics efforts.

These tools may also provide the evaluator or designer with recommended limits to the stressors present in a job, task, or job design. These limits may be used to assist in reducing the risk to safe levels. Furthermore, the results may be used to compare the same job or task before and after an intervention is put in place.

Who Should Perform an Ergonomics Risk Assessment?

The answer to this question is dependent on the reason for the assessment. An ergonomics risk assessment tool can, in many cases, be implemented by any person within a facility with the proper amount of training. In fact, for ergonomics teams that are primarily made up of employees, the use of ergonomics risk assessment tools provides a valuable method of increasing the sophistication by which the team members evaluate a job.

When considering why to perform an ergonomics risk assessment, these reasons can be lumped into categories that guide us towards who should be performing the assessment. Consider the first two questions that an ergonomics risk assessment tool addresses:

“Which jobs pose the greatest risk?”

“How much is too much?”

These questions revolve around the core of ergonomics, and are a level of training that would be of value to anyone. Therefore, if an ergonomics risk assessment tool is used primarily as a training tool, then anyone can use this tool with sufficient training. The key here is that the tool provides a means of taking the analyst from a basic, subjective approach to a more quantitative approach (i.e. they learn something). The use of the advanced tool is not an absolute necessity in this situation, but it helps the analyst see how ergonomics stressors and exposure factors combine to help predict risk. This knowledge will improve any subjective assessment that an analyst performs in the future.

The next two questions that an ergonomics tool addresses present a different consideration of who should perform the assessment:

“How can improvements be shown and evaluated?”

“How can ergonomics efforts be documented?”

When answering questions like these, accuracy becomes a much larger consideration. Therefore, the person performing the assessment has a higher level of significance. Consider the level of importance of data that is used to justify an ergonomics project or determine the work-relatedness of an injury in a workers' compensation case. In situations like these where financial and/or legal factors come into play, the need for experienced and trained analysts is evident. In cases where a project is costly with respect to capital changes or the possibility of a deposition or trial is looming, a company may want to consider the use of a professional ergonomist.

How Should You Perform an Ergonomics Risk Assessment?

Considering the number of ergonomics risk assessment tools that are available in books, peer reviewed literature, and from various companies and consultants, it is impossible to actually provide instructions on how to perform each of these assessments. Instead, there are three simple recommendations that one should follow when choosing a tool that will help achieve accurate and valuable outcomes.

1. *Read original articles and/or documentation to understand the design, use, and intent of the ergonomics tool.*

One of the most common errors that is made with an ergonomics risk assessment tool is using the tool incorrectly and for the wrong purpose. When an ergonomics tool is developed it is usually with a specific purpose, such as evaluating a specific type of activity (e.g. lifting, posture, hand activity, etc.) or a specific work environment. The validity of the tool may be compromised if used outside of these conditions, so it is important to know the boundaries that must be adhered to.

One of the challenges and flaws that is often evident when reviewing the information about an ergonomics tool is that there is insufficient information to determine the exact way in which the tool should be implemented. Further, it is impossible to determine what to do when attempting to apply the tool in non-optimal conditions (i.e. what do you do when a novel situation develops?). One would expect that a tool presented in a peer-reviewed article would not fall into this same category, but in many cases the article focuses primarily on the theory and design of the tool and not its practical application. This problem leads to the 2nd recommendation.

2. *Establish assumptions and decision criteria for the tool.*

In order to consistently and effectively apply an ergonomics tool, it is important to interpret the design and approach of the tool and develop appropriate strategies to implement it consistently and accurately. Once the boundaries of the tool are understood, then it is necessary to develop decision criteria to ensure the tool is always used within these boundaries, and that users of the tool will achieve consistent outcomes (i.e. reliability).

If a tool is used consistently, then the output of the tool can be used to measure such conditions as baseline exposure, differences in exposure, and changes in exposure. With this level of consistency it is unnecessary to have a tool that has external validity (i.e. correlation with injury causation). Instead, the tool simply provides a means of accurately measuring changes in exposure, which is of value in itself. If the tool has been validated through research such that it has external validity, then the value of the measures is even greater.

3. *Provide sufficient time for training and practice.*

One of the most critical factors in achieving accurate, consistent output from an ergonomics risk assessment tool is practice. Once an individual is trained on the design and boundaries of the tool, and on the process and decision criteria for implementation of the tool, then it is necessary to practice, practice, and practice again.

An analyst should be able to explain the theory of a tool, discuss the measures and methods that are used to apply the tool, describe the output of the tool, and interpret the output of the tool before they begin to apply it in real world situations. This does not mean that a person cannot use a tool without this absolute level of knowledge; instead, this means that the person should practice and learn about the tool in a work setting, but refrain from using the outputs until they are positive that their process is accurate. In this interim stage it would be of value to discuss the implementation of the tool with a mentor or long-time user. In the ergonomics

community, the use of email list servers provides an opportunity to learn from colleagues, or the Board of Certification in Professional Ergonomics (BCPE) website (www.bcpe.org) provides a listing of professional ergonomists around the country; a local professional may be willing to provide mentorship in this process.

Conclusion

The use of ergonomics risk assessment tools may provide answers for ergonomics evaluators and their ergonomics programs. Their use may provide acceptable limits for exposure and help provide guidelines for ergonomics efforts.

Qualitative evaluations, while helpful in identifying problem jobs, may require further investigation to aid in solution development. The use of the ergonomics risk assessment tools may provide a means by which the reductions in stressors are validated and documented. The numeric output may assist in providing indications for future ergonomics efforts, or allow comparisons between jobs. Further, their use may also provide justification of interventions and allow documentation of ergonomics efforts.

However, it is critical that the user understand all elements of these tools. Each has its own set of strengths, weaknesses, and potential applications. With proper training and practice, an ergonomics risk assessment tool can be a valuable addition to an ergonomics program.

Suggested Resources:

Water, T.R., Putz-Anderson, V., Garg, A., and Fine, L.J. 1993, Revised NIOSH equation for the design and evaluation of manual lifting tasks, *Ergonomics*, **36(7)**, 749-776.

National Institute for Occupational Safety and Health 1994, *Applications Manual for the Revised NIOSH Lifting Equation*. Publication no. 94-110 (Department of Health and Human Services (DHHS), NIOSH).

Snook, S.H. and Ciriello, V.M. 1991, The design of manual handling tasks: revised tables of maximum acceptable weights and forces, *Ergonomics*, **34(9)**, 1197-1213.

Moore, J.S. and Garg, A. 1995, The strain index: a proposed method to analyze jobs for risk of distal upper extremity disorders, *American Industrial Hygiene Association Journal*, **56**, 443-458