The Effectiveness of Job Rotation on Work Performance
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Introduction

Responding to the risk of musculoskeletal disorders (MSDs) is necessary in the modern workplace, but it is sometimes difficult to determine the validity and effectiveness of different strategies. Job rotation is one strategy that often causes confusion.

Risk reduction strategies fall into three different categories, commonly referred to as the hierarchy of controls: engineering controls, administrative controls, and work practices. Job rotation is an administrative control wherein workers are rotated through various jobs in an attempt to reduce fatigue and risk exposure by distributing workloads. Many employers are considering or already using job rotation. It is a fairly intuitive strategy, and it has been recommended by the Occupational Safety and Health Administration (OSHA) to minimize the discomfort associated with MSDs. However, scientific research shows a mixed consensus on the effectiveness of job rotation and whether it benefits or hinders employees. A limitation of the current research is the significant variability across studies, since factors such as job type, training, rotation intervals, and implementation are highly dependent on the situation.

Unlike an engineering control, job rotation does not address the root causes that may lead to MSDs. Rather, as an administrative control, it reduces the duration of risk exposure for individual employees. One consideration of particular note is that job rotation may expose additional people to existing risk factors, thus increasing their overall risk of injury. Furthermore, the manner in which job rotation is implemented in the workplace may determine its success as a strategy for providing mental benefits and productivity increases.

Theory of Job Rotation

Job rotation is a common practice among employers, despite conflicting scientific evidence. Research has shown that repetitive work leads to an increase in employee dissatisfaction, discomfort, and MSD risk (Bitencourt & Guimarães, 2012). As such, employers with job tasks that require mundane, tedious, or high-frequency work may seek to use job rotation as a means to reduce MSDs. The apparent simplicity of job rotation is attractive to many employers and it is frequently discussed as an easy solution for reducing injury risk, while some companies focus on job rotation as a means to provide flexibility and improve employee morale. However, effective job rotation is not simple, and in many instances, there is a lack of adequate training, rotation between similar jobs, set rotation intervals, and follow-up. These factors may help to create a workplace that is worse off than it was before. In this paper, we will take a critical look at the scientific literature available on job rotation as it relates to MSD prevalence, employee morale, productivity, and quality. We will also review the results of a job rotation survey administered by Humantech, identify considerations for designing a job rotation program, and identify best practices companies should focus on.
Research

A comprehensive review of published articles was conducted. 45 articles were reviewed, and 11 articles pertaining to the impact of job rotation were analyzed in more detail. The focus of reviewing the research was to investigate the impact of job rotation on three key aspects:

- Musculoskeletal disorder (MSD) injuries or complaints
- Employee morale
- Productivity and quality gains

Findings from the review are summarized in following sections.

Job Rotation and MSDs

Musculoskeletal disorders are injuries involving muscles, bones, tendons, ligaments, nerves, cartilage, and spinal discs. They often occur at joints in the body, such as the neck, shoulders, elbows, knees, and lower spine. The primary focus of many employers, when implementing a job rotation program, is to reduce MSDs by distributing exposure to these risk factors as employees rotate through jobs. However, job rotation does not change the risk associated with a particular job; it simply limits the amount of time a person spends on that job per week.

Based on a review of 11 articles published between the years of 1999 and 2012, the actual benefits of job rotation, with respect to MSDs in the workplace, are unknown. While in some cases MSD-related complaints have been shown to decrease, the overall impact on the prevalence of MSDs is inconclusive. For example, Rissén et al. (2002) studied the work of cashiers before and after job rotation. Although it was found that the change reduced blood pressure and muscle activity, the prevalence of pain as a result of MSDs remained the same. In a study conducted by Fredriksson et al. (2001), employees at an automobile assembly plant began rotating through tasks four times a day. At the end of the study, these employees reported significant increases in MSDs in the upper body, whereas the reference group raised no concerns.

It is critical for the prevention of MSDs that different muscle groups are targeted, so the most apparent factor for successful job rotation is which jobs are involved (Tirli, et al., 2012). Unfortunately, this is rarely as straightforward as it seems because of the interdependence in the musculoskeletal system. When suitable jobs are not chosen, the risk of MSDs may actually increase. Both peak and cumulative muscle loads must be considered when determining appropriate jobs; job rotation has an impact on both of these loads, making it more difficult to assess risk and minimize MSDs in practice (Frazer, Norman, Wells, & Neuman, 2003). The way in which job rotation is implemented also has an effect on MSDs in the workplace. A poorly implemented program has potential for negative effects since the redistribution of risk may not be uniform (Frazer, Norman, Wells, & Neuman, 2003). Lastly, if employees are not properly trained for each new job in the sequence, the risk of both acute and chronic injuries will increase.
Overall, the effectiveness of job rotation as a means to reduce the incidence of 
MSDs in the workplace remains inconclusive, with demonstrated benefits being 
very specific to the situation investigated.

Job Rotation and Employee Morale

The mental aspect of daily work is important to consider. Employees are often 
dissatisfied with their work when it is highly repetitive and when there are few 
opportunities to gain new skills. When done properly, job rotation can help to 
improve and maintain employee well-being by providing variability to alleviate some 
of this burden. Research shows that job rotation can have considerable 
psychological benefits for employees, including better opportunities to learn and 
influence their work.

In the study by Rissén et al. (2002), questionnaire responses indicated numerous 
positive social benefits, including higher employee satisfaction with respect to their 
own impact on the job and improved pride in their work. Raina and Dickerson 
(2009) completed research on job rotation and fatigue that supports the idea that 
perceived effort can be reduced when job rotation is used. In a study of job rotation 
in a manufacturing company, although the work still had a cycle time of less than 
30 seconds, the employees enjoyed the change in work type that was provided. 
The employees in the reference group commented that they would have preferred 
to learn new tasks as well (Bitencourt & Guimarães, 2012).

The improvement in employee morale as a result of job rotation is largely reliant on 
the job choice, training provided, and implementation process. When each of these 
aspects are given proper consideration, job rotation can prove to be beneficial. 
However, there is also conflicting evidence. In a study of workers in the automobile 
industry, employees were found to be less content in situations when job rotation 
created jobs that were more repetitive and training was insufficient. The authors of 
this study noted the interaction between physical and psychosocial work factors, 
and that these were associated with MSDs as well (Fredriksson, Bildt, Hägg, & 
Kilbom, 2001).

Job Rotation and Productivity and Quality

The consideration of productivity and quality is often at the forefront when making 
changes to production processes. Management concerns about how job rotation 
will affect productivity and product quality is expected, but in recent research it has 
been a struggle to quantify these effects. Many studies did not measure 
productivity, or found insignificant relationships. In some cases, job rotation was 
shown to provide benefits that, in turn, could be valuable for production and quality. 
For example, fatigue decreases the work capacity of an employee throughout the 
day. Filus and Okimorto (2012) studied the effects of job rotation on muscle fatigue 
and found that lactic acid production can be reduced. Raina and Dickerson (2009) 
also determined that rotating between tasks results in less fatigue. It is important to 
note, however, that there is no direct relationship to fatigue and productivity, and 
that job rotation is not equivalent to providing rest breaks.
Here again, the jobs, training, and implementation involved in job rotation will influence the impact the program has. Keir et al. (2011) concluded that, depending on the work, rotating jobs will not necessarily improve productivity. There is potential to improve production through job rotation, but many factors can influence the outcome.

Survey Findings

In an attempt to fill some of the identified gaps in the research, Humantech surveyed different companies in order to provide additional information regarding job rotation practices in industry. There were 225 unique responses to the survey. Respondents represented a range of responsibility, from managing a single site to managing over 100 sites. The workplace size and complexity of each organization surveyed varied widely. Some organizations have between 1 and 100 people, while others have more than 5,000. The majority of companies that were surveyed do use job rotation, but 39 (16%) of the respondents reported that they do not. Respondents represented 18 different industries, with a majority (53%) in manufacturing.

The charts below summarize reported job rotation practices and the resultant impact on MSD incidence rate, employee morale, productivity, and quality:
What impact has the job rotation schedule had on employee morale?

- Employee morale has improved: 49.1%
- Employee morale has declined: 25.1%
- Employee morale has remained unchanged: 23.4%
- Unsure/not measured: 2.3%

What impact has the job rotation schedule had on productivity?

- Productivity improved: 38.2%
- Productivity decreased: 27.1%
- Productivity remained unchanged: 4.7%
- Unsure/not measured: 30.0%
In summary, job rotation has been shown to reduce MSD incidence rates and improve employee morale and, to a lesser extent, have a positive impact on productivity and product quality. The magnitude of increase or decrease for employee morale, productivity, and quality was not reported or not measured. In addition, the data is difficult to link directly to the presence of a job rotation program.

Survey responses were self-reported by individual companies and findings were not audited. None of the findings presented here are considered statistically significant results.

**What to Consider When Designing Job Rotation**

Job rotation programs should be thoughtfully designed. Since employees complete these jobs every day, it is both helpful and important that they are involved in the process; this will ensure the transition is understood and welcomed, and may help to prevent future injuries. Below are some key points to consider when planning for job rotation.
**MSD Risk Analysis**

A critical stage in planning job rotation is determining which jobs are suitable for rotation. First, an MSD risk analysis should be completed by a qualified person using objective risk assessment tools. The tools provide a scientifically proven basis for decision-making, and should be used by a qualified person to ensure that the risk factors of jobs are different. Then, a risk map of the facility can be created. Both of these strategies will provide a scientifically proven basis for decision making with respect to the job rotation schedule. A key objective should be to avoid consecutive high-risk jobs in a schedule. For example, two jobs with increased risk of injury to the shoulders should not be completed back-to-back. To effectively determine the MSD risk at each body part, analyze individual body part loading (both peak and cumulative) for each job. A job rotation schedule should provide potential to reduce exposure and fatigue, and to introduce variability.

**Intervals**

Job rotation should be operated on a consistent schedule. Intervals may be optimized according to production timing and other factors, but research has shown that rotation intervals of 1 to 2 hours can minimize fatigue (Filus & Okimorto, 2012).

**Rest**

Rest periods are still necessary throughout a job rotation cycle. Completing a new job does not equate to rest, and breaks are still required for recovery. In addition, it may be beneficial to begin a job rotation sequence with a "warm-up" job.

**Training**

Prior to starting a job rotation program, provide proper training to all affected employees. Employees who are not prepared to complete a new job are more likely to experience pain and a negative attitude. The implementation process on the whole should be carefully planned and carried out. Also consider job complexity before employing job rotation; more complex jobs will require additional training and cost.

**Workforce**

The demographic of the workforce may influence job rotation decisions, specifically if there is an aging workforce. Job rotation may not be suitable because it increases job complexity while the abilities of the workforce may be decreasing.

**Follow-Up**

Following the introduction of a job rotation program, ensure that there are no new issues or complaints.
What Should Companies Focus On?

The use of engineering controls means making physical changes to tasks, tools, and workstations to eliminate non-neutral postures and high forces. It means fitting the task to the worker, and is the most effective way of reducing MSDs and worker discomfort, since the root cause is identified and addressed directly. When an organization implements engineering controls, all of its employees can avoid exposure to unnecessary risk.

Job rotation is an administrative control, or a management decision that affects work practices but not the work specifically. These types of interventions have a place in the workplace and are a great supplement to engineering controls, but they should not be used as the main form of risk reduction. It is difficult to plan and predict the effectiveness of an administrative control. In the case of job rotation, since employees cycle through different jobs, the risk associated with each specific job is not reduced; only the individual exposure is. Furthermore, if an employee cycles into a job with higher risk, that individual will have a greater risk of injury than before the job rotation was implemented.

Engineering controls should be the first line of action for combating injury risk in the workplace. Companies may start by prioritizing job tasks based on objective risk assessments as well as injury rates; this will help to identify the sources of any problems, and then improvements can be made. Reducing risk from the actual job in this way will benefit all employees, and may create opportunities for additional strategies, such as job rotation, in the future.

Finally, when designing a job rotation schedule, a proper job analysis should be performed by a qualified person to ensure variation in use between different muscle-tendon groups (OSHA, 1993). In short, use valid risk assessment tools to ensure that there is a separation of risk factors between jobs. Risk assessment tools used should differentiate jobs by risk factors to individual body parts to ensure that employees are rotating between jobs with different body part risks.

Conclusion

Job rotation is an administrative control used to reduce individual injury risk by distributing risk exposure among various employees. It does not reduce or eliminate the risk inherent to a task. For this reason, engineering controls are the preferred method of risk reduction in the workplace. While job rotation may be used to supplement engineering controls, it is important that the program is based on objective risk analyses.

Some factors to assess when considering job rotation include the skills of the workforce, variation of muscle groups used, exposure to a task by more employees, ratio of intervals and rest, proper employee training, and the plan for implementation.

Job rotation is not a quick fix for repetitive jobs. Proper consideration should be given to each of these factors because a poorly executed job rotation program can have a negative effect on injuries and employee satisfaction.
References


About Humantech

For over 35 years, global companies have relied on Humantech for workplace improvements. By combining the science of ergonomics and our unique 30-Inch View®—where people, work, and environment intersect—we deliver practical solutions that impact safety, quality, and productivity. At Humantech, we believe people make productivity happen.

Our clients look to us for the tools and knowledge necessary to create a bridge between humans and their work environments. By furthering an understanding of the capabilities and limitations that people have, Humantech strives to improve the safety and productivity of workers in all environments while, at the same time, enabling these workers to produce the highest quality products and services.

Companies that make the move from a reactive approach to injuries to a proactive and/or advanced approach to workplace design, find that ergonomics is central to executing at the highest levels. Humantech helps companies identify and quantify injury risk in the workplace, provides training and consulting aimed at removing that risk, and delivers management systems that embed these processes into a corporate culture.

To learn more about how Humantech can optimize the capabilities of your workforce, please contact us:

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