

INITIAL ERGONOMICS RISK ASESMENT (ERA) IN THE LIBRARY CONDUCTED BY ERGONOMIC TRAINED PERSON (ETP) IN EVALUATING POTENTIAL ERGONOMIC RISK FACTORS (ERFs)

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Abstract: *The library environment encompasses a range of activities, including reading, computer usage, book shelving, and customer service responsibilities, all of which might provide ergonomic hazards. An Initial Ergonomics Risk Assessment (ERA) is conducted to identify and reduce these hazards in order to enhance user comfort, health, and productivity. The objective of the Initial Ergonomics Risk Assessment (ERA) in the library is to detect potential ergonomic hazards that could lead to musculoskeletal diseases (MSDs) among library staff and patrons. This assessment will concentrate on examining the selected physical arrangement and activities carried out in the library in order to suggest enhancements that improve ergonomics and decrease the likelihood of harm. Research technique is performing systematic inspections to visually observe the ongoing activities, capture images, and collect pertinent details regarding the existing procedures and utilized machinery. Conduct interviews and surveys with library personnel and patrons to gather their feedback on ergonomic issues and areas that want enhancement. The risks are then prioritized based on their impact. Create actionable suggestions to minimize identified hazards, such as modifying furniture, equipment, task protocols, and layout configurations. Prior to lifting heavy things, engage in a warm-up routine and perform stretching exercises to enhance muscle flexibility and lower the chances of strains and sprains. If the above recommendation is improved, no requirement for the Advanced ERA.*

Keywords: *Initial Ergonomics Risk Assessment, Ergonomics Risk Factors, Work Unit, Library, Ergonomic Trained Person*

Introduction to Initial Ergonomic Risk Assessment (Era) in the Library

The Initial Ergonomic Risk Assessment (ERA) is a technique used for finding and evaluating potential Ergonomic Risk Factors (ERFs) in the workplace that could harm the musculoskeletal system of workers and impact their task performance. Prolonged exposure to ergonomic risk factors in the workplace, such as awkward postures, static postures, forceful exertions, repetitive motion, vibration, contact stress, and environmental factors, can cause chronic musculoskeletal discomfort for workers. The library has proactively implemented the Initial ERA. The library management assigned to assess three (3) chosen work units. The early ERA offers an early assessment of the ergonomic risks factors faced by workers. Work units assessed as having a high exposure to ergonomic risk factors for workers. An advanced ERA approach will be recommended if required for further investigation. The methodology used for the Initial ERA is in accordance to Department of Occupational Safety and Health (DOSH) Guidelines on Ergonomic Risk Assessment at Workplace 2017. Section 7-Appendix 2 is referenced for the DOSH approved Ergonomic Trained Person (ETP) who conducted this evaluation.

Literature Review and Methodology

Almost all industrial and office work environments contain ergonomic risk factors. In the workplace, safety professionals who are proficient in the practical implementation of ergonomic principles and the assessment of ergonomic risks are in high demand and will have an advantage when it comes to career opportunities. This chapter introduces a practical risk assessment model and a simplified ergonomic risk assessment instrument that can be employed to mitigate ergonomic risks and reduce work-related musculoskeletal disorders. Numerous adverse consequences may result from ergonomic hazards in the workplace. Ergonomic risk factors, or stressors, are indicators of ergonomic hazards. It is imperative to establish a standardized approach to ergonomic risk assessment, which should encompass user training and the use of appropriate ergonomic risk assessment instruments. A cross-functional team of trained and qualified members is the most effective in conducting ergonomic risk assessments. Standard risk assessment efforts may overlook ergonomic hazards and latent conditions, which are present in nearly all work systems to a certain extent (Lyon & Popov, n.d.). Ergonomics in libraries is a relatively new concept that emphasizes the arrangement of equipment and workstations to prevent injuries stemming from repetitive strain and poor posture (Mukhedkar & Waikar, 2024).

The necessity of ergonomic assessments to resolve these concerns has been underscored by the rise in hand, wrist, and arm injuries that have resulted from the increased use of computers in libraries (Chao, 2001). The steps taken in Initial Ergonomics Risk Assessment were briefing and preliminary discussion and the assessment for selected Work Units using DOSH ERA Checklist. The methodology applied is Qualitative with observation techniques to evaluate potential ergonomics risk factors observed during task activities. Examples of ergonomic risk factors are as follows (Department of Occupational Safety and Health (2024):

- i. Awkward postures: Condition that creates postural stress on muscles, tendons, nerves, and blood vessels, or joints.
- ii. Forceful exertions: Muscular effort to accomplish a specific movement or exertions that have significant impact on muscles, tendons, nerves, and blood vessels, or joints.
- iii. Static loading: A fixed position with muscular effort and minimum movement that can easily strain muscles in short duration.

- iv. Static posture: A fixed position, with minimal movement of the particular body parts that can fatigue muscles in short duration.
- v. Contact stress: Localized pressure exerted against the skin by an external force that can block blood flow and damage skin tissue.
- vi. Some combination, repetition or prolonged duration of ergonomics risk factors stated above
- vii. Others environmental factors such as heat, vibration, etc. (if relevant)

Inappropriate postural load, inadequate environmental conditions, and psychosocial factors are among the most prevalent ergonomic hazards in libraries. These can be further exacerbated by inadequate illumination or noise levels and poorly designed furniture (ÖZDEMİR & ALBAYRAK, 2024). In order to mitigate health hazards comparable to those encountered in industrial and commercial environments, libraries must prioritise human factors following the implementation of advanced technology (Thibodeau & Melamut, 1995). It is imperative that personnel who have received ergonomic training conduct comprehensive risk assessments, as the management can identify and recommend solutions to effectively mitigate ergonomic risks (Mukhedkar & Waikar, 2024) (Thibodeau & Melamut, 1995). Training library staff in ergonomics can increase awareness and encourage the adoption of practices that decrease the probability of injuries (Mukhedkar & Waikar, 2024).

The broader context of library operations is also crucial to consider, despite the emphasis on ergonomic risk mitigation. Technological advancements are causing libraries to evolve, which may result in the introduction of new ergonomic challenges. In this evolving environment, it is imperative to maintain the health and well-being of library staff and consumers through ongoing training and the adaptation of ergonomic practices.

Result and Discussion

Work Unit 1 is the relocation of bookshelves. The recommendations for the assessment are to ensure that the management are employing the appropriate lifting techniques to reduce the tension on the workers lower back. Therefore, educate the workers to properly use leg muscles to lift the burden safely and effectively, rather than arms and shoulders, and bend at knees, not waist. Whereas, rely on the strength of leg muscles to produce the requisite force when squatting to lift heavy objects. This method mitigates the likelihood of lower back injuries. The management shall invest in the necessary tools and apparatus to facilitate the secure handling and movement of heavy loads, such as hoists, lifting straps, or trolleys. When transporting heavy items over extended distances, it is important to schedule regular rest periods to allow worker's muscles to unwind and stretch. This procedure mitigates the likelihood of injury and prevents fatigue. Perform a brief warm-up and stretching routine before lifting weighty objects as put the noticeboard giving information to the workers. This increases the flexibility of muscles and substantially reduces the probability of strains and sprains. The Advanced ERA (Ergonomic Risk Assessment) may not be necessary if these safety measures are implemented effectively as Figure 1

Work Activities	Observed Ergonomics Risk Factors				Musculoskeletal Assessment	Require Advanced ERA?	Recommendations
Work Unit 1: Moving book racks using trolley Moving book racks using trolley Distance : more than 10m <u>Task exposure:</u> Working hours : 8am-5pm Frequency : 6 trolley per day 1 trolley for 100 books 600books per day 2 times per week @ 8 times per month @ Every alternate month exclude semester break on March and August; 5 times (January, April, June, September and November per year. <u>Duration :</u> Continuous : 30minutes per trolley 2hours for 6 trolley Work area : Level 1 only	Ergonomics risk factors (ERFs)	Catalyst (long duration or repetition)	Ergo-concern score (1 – 10)	Body parts involved	Body Part affected	C1/C2/C3	Yes Workplace improvement Utilize correct lifting methods to reduce stress on your lower back. Utilize your leg muscles to lift the load instead of depending only on your arms and shoulders. Utilize your leg muscles to generate power when you squat down to lift the burden. Utilize appropriate equipment by purchasing gear specifically designed to aid in the safe movement of big loads. When transporting a large weight over a considerable distance, make sure to take regular rests to relax and stretch your muscles. This can aid in preventing tiredness. Prior to lifting heavy things, engage in a warm-up routine and perform stretching exercises to enhance muscle flexibility and lower the chances of strains and sprains. If above recommendation is improved, no requirement for the Advanced ERA
	Forceful exertions	Repetition	7	Shoulder, Hand and Lower Back	Neck	C1	
	Poor postures	-	-	-	Shoulder	C1	
	Static loading	-	-	-	Upper back	C1	
	Static posture	-	-	-	Upper arm	-	
	Contact stress	-	-	-	Elbow	-	
	Vibration	-	-	-	Lower arm	-	
	Lighting	-	-	-	Wrist	-	
	Temperature	-	-	-	Hand	C2	
	Ventilation	-	-	-	Lower back	C2	
	Noise	-	-	-	Thigh	-	
	Combination of ergonomics risk factors	Repetition	7	Shoulder, Upper back, Upper arm, Hand and Feet, Lower Back	Knee	-	
					Calf	-	
					Ankle	-	
					Feet	C1	

Figure 1: Work Unit 1 Moving Bool Racks Using Trolley

Work Unit 2 is to ensure that maintain a proper posture throughout the entire lifting procedure. Maintain a straight back, shoulders that are pulled back, and abdominal muscles that are engaged. Utilise the strength of leg muscles by flexing the knees and hips during squatting. Consider reducing the weight of the burden or dividing it into smaller, more manageable components to alleviate physical strain. Utilise assistive devices, such as wrist braces or knee cushions, to alleviate pressure and offer support to joints. To prevent fatigue and mitigate the risk of overuse injuries, it is important to take regular breaks to stretch and relax the muscles. To prevent repetitive strain and allow different muscle groups to recover, it is important to alternate duties that involve different movements. Wear footwear that is supportive and has sufficient cushioning to alleviate the impact on the knees and improve stability during vertical movements and lifting. The necessity for an Advanced Ergonomic Risk Assessment (ERA) may be eliminated if these recommendations are implemented effectively enhanced as in Figure 2.

Work Activities	Observed Ergonomics Risk Factors				Musculoskeletal Assessment	Require Advanced ERA?	Recommendations
Work Unit 2: Transfer books to the rack and do arrangement <u>Transfer books to the rack and do arrangement</u> Task exposure: Working hours : 8am-5pm Frequency : 3 rack per day 1 rack for 50 books 150books per day 2 times per week Height of rack 0-1.7m Working posture : Stand and Walk Distance : more than 2m Duration : Arrange books Continuous : 1 hour per rack 3hours for 3 rack Work area : Level 1 only	Ergonomics risk factors (ERFs)	Catalyst (long duration or repetition)	Ergo concern score (1 – 10)	Body parts involved	Body Part affected	C1/C2/C3	Yes Ensure proper posture for the entire exercise. Maintain proper posture by keeping your back aligned, shoulders pulled back, and core muscles activated. Flex your knees and hips while squatting to utilize the power of your legs for lifting. To lessen pressure on your body, consider reducing the weight of the burden or dividing it into smaller, more manageable sections. Utilize assistive items like knee pads or wrist braces to offer support and alleviate pressure on your knees and wrists. Make sure to take frequent breaks to relax and stretch your muscles. This can aid in preventing fatigue and decreasing the likelihood of overuse problems. Alternate between tasks that include diverse movements to provide various muscle groups with rest and avoid overuse. Utilize supportive footwear with adequate padding to minimize knee impact and enhance stability during vertical movements. If above recommendation is improved, no requirement for the Advanced ERA
	Forceful exertions	-	-	-	Neck	C2	
	Poor postures	Repetition	7	Lower back, Knee, Wrist	Shoulder	C2	
	Static loading	-	-	-	Upper back	-	
	Static posture	-	-	-	Upper arm	-	
	Contact stress	-	-	-	Elbow	-	
	Vibration	-	-	-	Lower arm	-	
	Lighting	-	-	-	Wrist	C1	
	Temperature	-	-	-	Hand	-	
	Ventilation	-	-	-	Lower back	C2	
	Noise	-	-	-	Thigh	-	
	Combination of ergonomics risk factors	Repetition	7	Neck, Shoulder, Lower back, Knee, Wrist	Knee	C1	
					Calf	-	
					Ankle	-	
					Feet	-	

Figure 2: Work Unit 2 Transfer Books to the Rack and Do the Arrangement

Work Unit 3 is to ensure that the computer or monitor screen is positioned at eye level to facilitate correct neck and head alignment. To attain a comfortable sitting posture, pull the chair closer to the desk. Reposition the mouse closer to the edge of the table to prevent bending forward, or maintain the body in close proximity to the desk for effortless access to the mouse. To ensure that the spine is properly supported, it is important to adopt improved work habits by sitting fully reclined in the chair. Implement the 'Take 5' routine to facilitate circulation and alleviate muscle tension through consistent stretching. Incorporate ergonomic stretching sessions for office workers to alleviate the physical strain that is associated with prolonged seating. The necessity of an Advanced Ergonomic Risk Assessment (ERA) may be rendered obsolete if these ergonomic practices are consistently implemented as enhanced as in Figure 3.

Work Activities	Observed Ergonomics Risk Factors				Musculoskeletal Assessment	Require Advanced ERA?	Recommendations
Work Unit 3: Office tasks using computer <u>Description:</u> Office tasks using computer <u>Task exposure:</u> Working hour : 8am-5pm Frequent usage of mouse • Duration : more than 2 hours continuous sitting.	Ergonomics risk factors (ERFs)	Catalyst (long duration or repetition)	Ergo concern score [1 – 10]	Body parts involved	Body Part affected	C1/ C2/ C3	Yes Ensure screen of computer/ monitor height is at the same level with the eye level. Move the chair near to the desk to get the comfort position. Make sure body near to desk to reach the mouse easily or move the mouse closer to the edge of table to avoid leaning forward. Change work habit to sit all the way to the back of the chair. Change work habit improving on the 'take 5' for stretching. Ergonomic stretching session to workers to minimize strain to the office workers. If above recommendation is improved, no requirement for the Advanced ERA.
	Forceful exertions	-	-	-	Neck	C1	
	Poor postures	-	5	Lower back, shoulder, neck	Shoulder	-	
	Static loading	-	-	-	Upper back	-	
	Static posture	-	5	Lower back	Upper arm	-	
	Contact stress	-	5	Elbow, Hand, Arms	Elbow	-	
	Vibration	-	-	-	Lower arm	C2	
	Lighting	-	-	-	Wrist	-	
	Temperature	-	-	-	Hand	-	
	Ventilation	-	-	-	Lower back	-	
	Noise	-	-	-	Thigh	-	
	Combination of ergonomics risk factors	-	5	Lower back, Neck	Knee	-	
					Calf	-	
					Ankle	-	
					Feet	-	

Figure 3: Work Unit 3 Office Tasks using Computer

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