

Proceeding of the 1st International Symposium of Public Health

"Emerging and Re-emerging Diseases"



Editors

Sri Sumarmi

Ika Yuni Widyawati

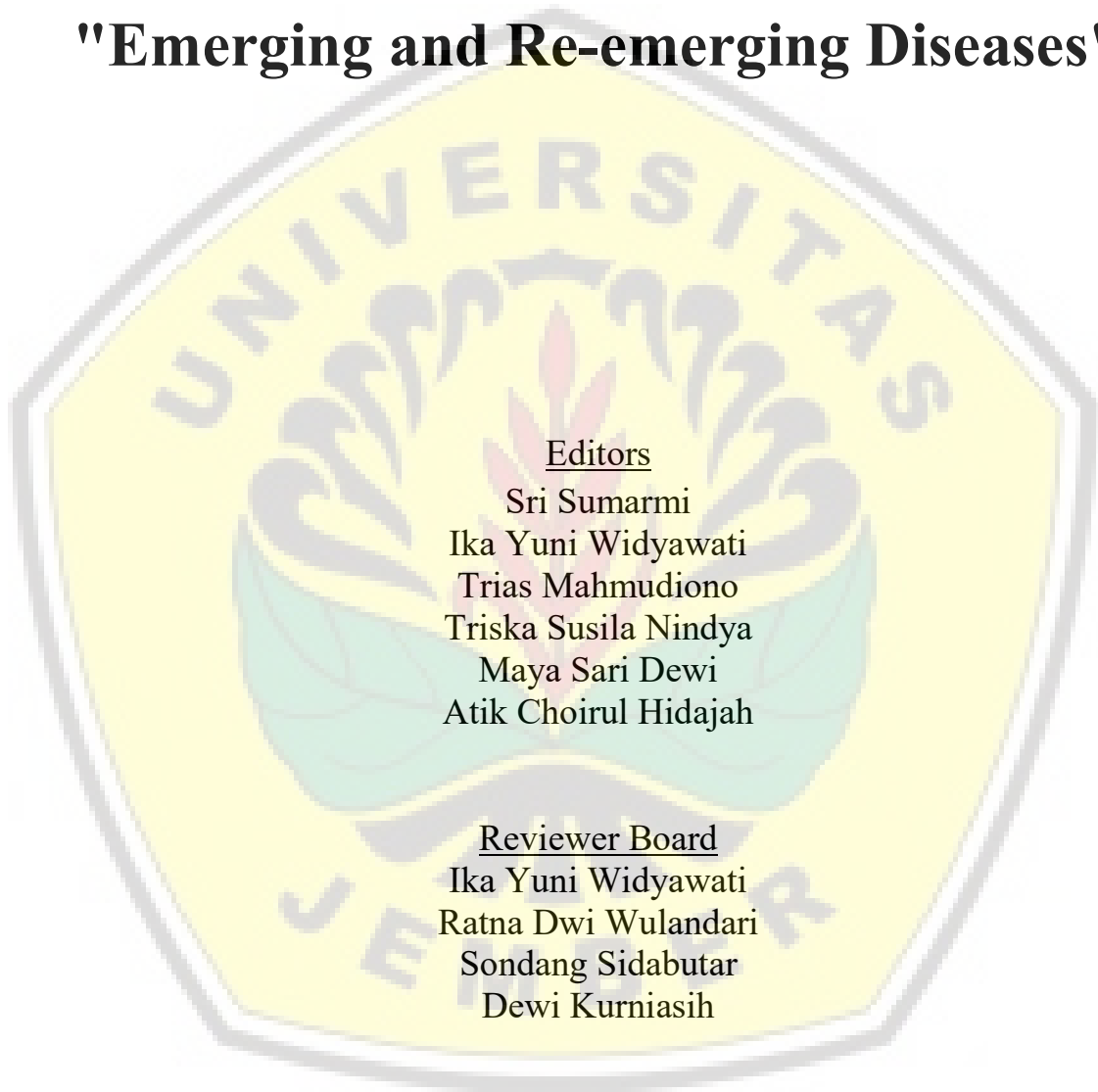
Trias Mahmudiono

Triska Susila Nindya

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Reviewer Board

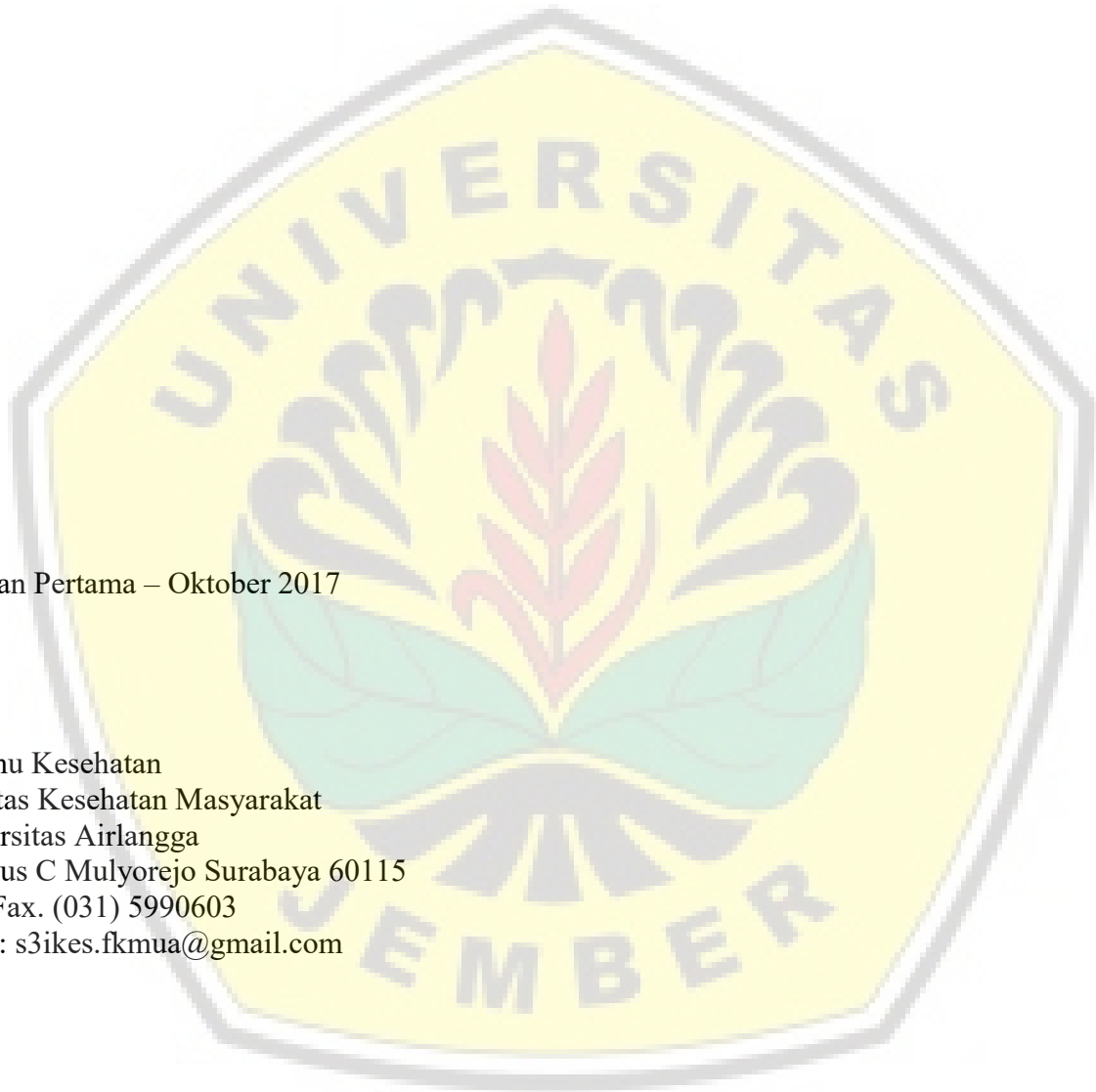
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Sondang Sidabutar
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S3 Ilmu Kesehatan
Fakultas Kesehatan Masyarakat
Universitas Airlangga

Proceeding of the 1st International Symposium of Public Health, "Emerging and Re-emerging Diseases"

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WELCOME MESSAGE

Assalamu 'alaikum warahmatullahi wabaraqatuh

I wish you all a warm welcome to Surabaya Indonesia.

It is a great pleasure for me to invite you in the 1st International Symposium of Public Health, held by Faculty of Public Health, Universitas Airlangga. This remarkable event is conducted by Doctorate and undergraduate program of Faculty of Public Health, Universitas Airlangga in collaboration with Airlangga Health Science Institute and Smart FM Surabaya. It's an honor to present "Emerging and Re-emerging Diseases" focusing on Zika virus as the main theme of our Symposium, as Zika being a new emerging disease in asia region.

The aim of this symposium is to disseminate the strategic planning of Indonesian Government, particularly the Ministry of Health, to prevent the transmission of Zika virus as well as the global and regional regulation. In relation to this matter, we invite Minister of Health as keynote speaker and also foreign expert: Professor Cordia Chu from Griffith University, Australia, but, unfortunately in this opportunity Professor Chu with a great regret can not come physically to Surabaya, due to a combination of critical family and urgent business. Instead, she likes to nominate Mr. Febi Dwirahmadi, SKM, MSc.PH, PhD to share the scientific knowledge about managing and Handling Zika in Community Setting. We also invite Dr. Pang Junxiong Vincent from National University of Singapore, who are going to discuss about the epidemiology of Zika, as well as Professor Nasronudin to present the role of Universitas Airlangga in research development.

The committee also invite the audience to submit abstracts in several sub themes in public health areas. We are expecting of two hundreds (200) participants, with at least ten percent (10%) coming from foreign countries and ninety percent (90%) from local participant coming from various region in Indonesia. There are a hundred and seven (107) abstracts were submitted, and then eighty nine (89) abstracts were accepted. From the accepted abstracts, there are fifty two (52) abstracts were accepted as oral presentation, and thirty seven (37) are presented as poster. This symposium was devided into two sessions, the plenary session and panel oral presentation. It is designed in such way, so that the delegates from various countryies or provinces, could share their local experience and best practices and discover ideas for strong regional initiatives.

At last, we would like to acknowledge for all parties which are provide the valuable materials as well as financial support for the successful symposium. As chair of organizing committee, I would also like to say deep thank you for all committees; my colleagues, and also students in faculty of Public Health Universitas Airlangga, who have been working to be part of a solid team and amazing committee.

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To all of audience, thank you very much for your participation in this symposium, I hope you enjoy not only the symposium but also the sparkling city of Surabaya.

Wassalamu 'alaikum warahmatullahi wabaraqatuh

Sincerely,

Chair Person

Dr. Sri Sumarmi, SKM, M.Si





UNIVERSITAS AIRLANGGA

Rector's Official Address
in
INTERNATIONAL SYMPOSIUM OF PUBLIC HEALTH
"Emerging and Re-emerging Disease"
November 30, 2016

Assalamu'alaikum wa-rahmatullahi wa-barakatuh.

May the peace, mercy and blessings of Allah be upon you.

Alhamdulillah! Praise be to Allah and along with this gratefulness let us also send *shalawat* and *salam* to our Prophet Muhammad SAW (Praise Be Upon Him): *Allaahumma shalli 'alaa Muhammad wa 'alaa aali Muhammad*. May Allah give mercy and blessings upon Him.

Ladies and Gentlemen,

The world always advances along with its challenges including in medical field. There are emerging diseases which have just occurred recently such as the one caused by Zika virus. There are also re-emerging diseases for the ones we assumed have been eradicated but they occurred again such as measles and polio.

Special for diseases related to Zika virus, some countries have declared a state of emergency. WHO even declared Zika virus transmission in South America as international public health emergency. Regarding the matter, for the global Zika virus epidemiology development, we regret to learn that information on Zika virus is limited such as on the risks, diagnosis, and the transmission method of the virus. In short, Zika virus has continued to spread and become a global precedence.

Therefore, this "INTERNATIONAL SYMPOSIUM OF PUBLIC HEALTH" is very welcomed and I appreciated the theme, "Emerging and Re-emerging Disease". I believe the communities, academic or general public will achieve benefits from the symposium results.

Ladies and Gentlemen,

Through this symposium, we are expected to get explanation and updates on measures to handle the "Emerging and Re-emerging Disease". The explanation is expected to give new insights for us to improve the quality of life as the demand to better quality of life, free from diseases, is even higher.



UNIVERSITAS AIRLANGGA

Hopefully, this event works as an effort to spread the knowledge and also functions as an input for the policy maker in medical field.

I would like to express my deepest gratitude to all participants, either domestic and from other countries, also to the committee and other parties who support this international symposium. I hope that our active participations can bring success to this seminar and they are regarded as act of kindness.

By saying grace: "*Bismillahirrahmanirrahim*", I officially open the "INTERNATIONAL SYMPOSIUM OF PUBLIC HEALTH" on "Emerging and Re-emerging Disease".

May this symposium be a success, run well and all the objectives achieved. Let us advance together to a better life in all aspects, especially in Public Health.

Have a great symposium and continue success!

Wassalamu'alaikum wa-rahmatullahi wa-barakatuh.

Rector of Universitas Airlangga,

Prof. Dr. Moh. Nasih, SE., MT., Ak., CMA.
NIP. 196508061992031002.

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ERGONOMIC ANALYSIS USING RAPID UPPER LIMB ASSESSMENT (RULA) METHODE ON LAUNDRY WORKERS

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ABSTRACT

Laundry is an informal business with characteristics fixed working hours, unspecific education, and a certain salary. Working time on laundry have characteristics in monotonous and repetitive. Almost all of laundry environment does not meets the requirements. Activities in the laundry process are at least six working stages, ie sorting, washing, drying, ironing and packing. On the sixth of these activities often carried out with improper position. This study aims to provide data or information to the government, employers and workers regarding ergonomics evaluation of the laundry. This research was conducted with the observation method using a questionnaire. Measuring instruments used in this study is the RULA, REBA and OWAS. Based on the work postures RULA scores drying unit in the category 6, which is the unit washing, ironing and packaging are included in category 4, which required further investigation and necessary improvements immediately. The reception unit was in the category 2, which is still safe and not necessary for investigations. Based on work posture REBA score with a high risk was in the drying and ironing unit. Work posture with the high risk was found in the washing unit and packaging. While safe working posture or no risk found on the reception. Based OWAS scores, almost all units still in category 1, the working posture does not cause health problems and unnecessary correction. In the ironing unit, working posture showed that although not pose a risk, but still needed improvement. Based on Nordic Score. The workers had musculoskeletal complaints on the right shoulder, left shoulder, right knee and left knee. Based on the research results it could be advised that it need improvement or redesign of work stations. In addition, it is recommended that the government should conduct surveillance on workers to prevent musculoskeletal laundry.

Keywords: ergonomics, work postures, musculoskeletal disorder

INTRODUCTION

Laundry effort is informal businesses that characterized by not fixed working hours, low education, and salary. Characteristics of work in the laundry are monotonous and repetitive. Not all of the laundry business working environment. Work activities in the laundry has at least six working stages, namely sorting, washing, drying, ironing and packing. In the sixth process of these activities are

often carried out with a position that is unnatural (OHSAH, 2003)

The first process is sorting process, in which workers weighing clothes to be washed, separating the colored clothes and colorless. This process is done manually. Potential hazards of this process comes from dust clothes, raised position while carrying loads of clothing to the wash basket with unnatural position that may cause falling or slipping. The second process is washing. In this process the

potential hazards that may arise is the use of detergents, perfumes and fabric softener. Chemical substances contained in detergents, fragrances and clothing can interact with the skin, eyes, respiratory and digestive tract. The third process is the drying process. Drying is done in two stages, namely by using a dryer and drying. The drying processes with machines cause noise and vibration. After passing through the drying step with the machine, it is followed by drying with drying. The fourth process is ironing. Ironing can be done in two ways, namely by steam irons and heat ironing. Conditions that dominate this process is the hot conditions (Public Services Health and Safety Association, 2010). Moreover ironing generally does not fit the size of the worker's body dimensions. This causes ironing position by bending, prolonged standing and legs bent. Ironing position is static posture. Area of ironing is not extensive, causing ineffective and repeatable movements.

The last process is packing. Packing is the process of inserting the finished ironed clothes in plastic wrap, and then placed in temporary storage closet. Packing activities involves static and repetitive hand and arm movements. Common positions are bending, lifting, rolling, lay on load on the rack or cabinet that exceeds the height of the worker. A research states that the work area is too high will cause discomfort working posture (Park, 2013). Statistics of accidents on the laundry workers were released by OHSAA 2003, mentioned that laundry workers had back complaints resulting from excessive stretching movements. The majority of workers reported experiencing repetitive movements, unnatural postures and overexertion. Research by Monteiro, et al in 2009, found that musculoskeletal complaints result in disruption of work ability.

The working process of laundry is loaded with potential danger. However,

not all workers are aware of the dangers because of lack of education and economy restraint. This phenomenon prompted researchers to study more deeply on occupational safety and health laundry through ergonomics analysis, with the ultimate goal of creating an ergonomic work area laundry and environmentally friendly.

MATERIAL & METHOD

The main data in this study were obtained from respondents directly through the measurement of work postures, working position, control, work activities, the lifting loads manually and risk of musculoskeletal complaints and work environment. The populations in this study were laundry workers in Jember district. This study was conducted over four months.

Validity and Reliability Testing of Rapid Upper Limb Assessment (RULA) Instrument is an instrument for measuring the working posture (Figure 1). Consists of three phases:

- 1) Phase 1. Development of methods for recording working posture. To generate a working method that is quick to use, the body is divided into segments that form two groups or groups namely groups A and B. Group A includes the upper and lower arm, and wrist. While Group B includes neck, back, and legs. This is to ensure that the whole posture is recorded, so that any irregularities or restrictions posture by foot, back or neck that may affect the posture of the upper body member can be included in the assessment.
- 2) Phase 2. A single score needed from Group A and B to represent the loading level of the posture of the musculoskeletal system to do with a combination of body postures. The sum score of use of muscle (muscle) and power (force) Score Posture A produce

C. Whereas the sum of the scores Posture B generates Score D.

3) Phase 3 Development of Grand Score and Action List

This stage aims to combine Score C and D into a single grand score that can provide guidance to the priority of the investigation/further investigation. Every possible combination C and D have been given rank, the so-called grand score of 1-7 based on the estimated risk of injury associated with musculoskeletal loading.

RULA normally used for:

- 1) Tools to conduct a preliminary analysis which is able to determine how much risk affected by factors that cause injury to workers, namely: posture, static muscle contraction, repetitive movements and styles.
- 2) Determine the priority of work by the risk factor of injury. This is done by comparing the value of different tasks that are evaluated using the Rapid Upper Limb Assessment (RULA).
- 3) Finding the most effective action for jobs that have a relatively high risk. Analysis can determine the contribution of each factor to an overall work its way through the value of each risk factor.

Instrument validity means that measuring instruments used to obtain data are valid, ie measure what should be measured. Reliable means that there is equality of data within different measurements (Sugiyono, 2012). In this study, it is not necessary to test the validity and reliability of the instrument, as a measuring tool REBA, RULA and Nordic Body Map is a measuring standard tool to assess posture, manual material handling, and complaints of musculoskeletal (Mc Atmeney, L, 1993; Kroemer, 2001).

Work environment that were studied in this laundry include hours of work, where standard operation procedures (SOP), the source of danger and waste disposal facilities. There were 30 surveyed

laundry work environments obtained 85 workers.

RESULT

A laundry business is informal sector employment. The informal sector has the characteristics of easy to enter, do not require special skills or education, and a simple equipment. In general the laundry business has no definite working hours. But the majority of laundry business hours starts at 07.00 or 08.00 to 15:00 or 16:00. It was also found that laundry is open from 08:00 until 21:00. Similarly, the hours of work, resting on a laundry unit is also uncertain. Break was not determined. The type of break according to ergonomics, the recess in the laundry including spontaneous break.

From thirty (30) surveyed laundry, the majority (90%) do not have a business license laundry. Most of the laundries were administered in the household. There were no official data from relevant divisions or offices about the data valid number of existing laundry. The majority of respondents aged was 20-25 years, with a high school education. The majority of respondents has been working for <1 year. The average length of work was 1.5 years. The majority of respondents were. Laundry s work does not require special education. There was no job skills training for workers before working in the laundry.

The stage of acceptance by the score RULA showed that majority of all respondents (40%) in two categories, namely the position was still acceptable and did not need correction. At the reception activity did not perform uncomfortable posture. All activities performed in a standing position. From the table above can also be described each response scores, the position of the upper arm or upper arm were 22 (73%) lifted upwards. Position lower arm or forearm 16 activities (53%) were at 0-90°. The position of the wrist or wrist majority

cranked up to the maximum range. The position of the majority wrist bent but still within reach. Majority neck position rotated between 0° to 10° .

The majority of body position were spinning and turning. The position of the majority was feet balanced. The washing step by Rula score showed all the activities of the majority (30%) in category 4 that required immediate correction. In laundering activities in question are washed manually. All activities was done in a sitting position. From the table above it can also be described scores in the washing steps respectively, the position of the upper arm or upper arm majority of the 15 activities (50%) was undergone from an angle of 15° to 45° . Position lower arm or forearm was 15 activities (50%) at $0-90^{\circ}$. All activities on the position of the wrist or wrist rotate but still affordable. The position of the majority wrist bent but still within reach. Majority neck position rotates between 0° to 10° . Body position majority were spinning and turning. The position of the majority was feet balanced.

The stage of drying, based on the score of RULA indicated that 11 activities (30%) was under category 6 which required further investigation and repair immediately. From the table above, it can also be described scores respectively that at the stage of drying. The position of the upper arm or sleeve over was the majority of the activity (50%) extension with an angle between 20° to 45° , shoulders lifted up and abduction. Position lower arm or forearm majority, namely 19 activities (63%) is at $0-60^{\circ}$. All activities on the position showed the wrist or wrist was rotate but still affordable. The position of the majority of wrist was bent but still within reach. Majority neck position rotates between 10° to 20° . The position of the majority of the activity used upright body. The position of the foot was balanced. At the stage of ironing by Rula score entirely, 14 activities (47%) were in category 4 that required further

investigation and, where necessary, immediate changes. From the table above, it can also be described scores respectively that at the stage of drying. The position of the upper arm majority showed that 14 activities (47%) had an extension to the angle between 20° to 45° , shoulders lifted up and abduction. Position lower arm or forearm majority revealed 11 activities (37%) at $0-60^{\circ}$. All activities on the position of the wrist or wrist were rotated but still affordable. The whole position of rotation of the wrist was still within reach. Neck position rotated between 10° to 20° . Spinning and looked down. The position of the majority of the activity employed the upright body and balanced feet position.

At the packaging stage based on the total RULA score indicated 14 activities (47%) in category 4 that required further investigation and, where necessary, immediate changes. From the table above, it can also be described scores respectively that the position of the upper arm or upper arm majority of 14 activities (47%) which had an extension to the angle between 20° to 4° , shoulders lifted up and abduction. Position lower arm or forearm majority, namely 17 activities (57%) was at $0-60^{\circ}$. All activities on the position of the wrist or wrist were rotated but still affordable. The whole position of rotation of the wrist was still within reach. The majority of the activity (47%) of the neck rotated between 10° to 20° . Spinning and looked down. Body position showed that the majority of 20 activities (67%) upright. The position of the foot was balanced.

In the laundry business or workflow activities are generally divided into five activities: receiving, washing, drying, ironing and packing. Of all the activities recorded in the admissions process, namely 249 activities, the majority of the activity that were 131 activities remained at level 1. Level 1 means the work attitude is in accordance to the musculoskeletal system and do not need improvement.

Of all the activities recorded in the admissions process, namely 401 activities, the majority of the activities (191) remained at level 1. All the activities recorded in the admissions process that were 844 activities, the majority of the activity were 503 activities remained at level 1. All the activities recorded in the admissions process that in 1106 activity, the majority of the activity that were 632 activities at level 2. Level 2 means the attitude of hazardous work on the musculoskeletal system 1 (working attitude resulted in a significant strain effect) need improvement in the future.

All the activities recorded in the admissions process, namely 663 activities, the majority of the activity were 204 activities at level 1. Musculoskeletal complaints in workers taken from the laundry in the laundry workers were elected to serve as a survey. The results assessment respondent characteristics and musculoskeletal complaints based assessment using Nordic Body Map.

Number of workers who did not have complaints was higher than those who experiencing musculoskeletal complaints at any location. These results illustrated that the laundry workers surveyed in good health and do not have complaints. From the workers who have complaints, the majority felt the complaint on the left shoulder and right shoulder. This was consistent with the results of the observation that the laundry activities involve a lot of hand gestures activities.

CONCLUSION

An overview of postures based on scores RULA found that based on the score RULA working posture on the drying unit into the category 6, the unit washing, ironing and packaging are included in category 4, which required further investigation and necessary repairs immediately. Whereas the reception unit is categorized into category 2, mean still safe

and not necessary further investigations. Musculoskeletal complaints experienced by the majority of laundry workers are complaints on the right shoulder, left shoulder, right knee and left knee.


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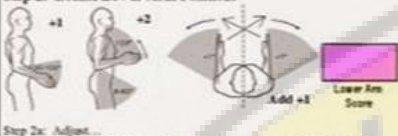
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RULA Employee Assessment Worksheet based on RULA: a survey method for the investigation of work-related upper limb disorders, McAtamney & Corlett, Applied Ergonomics 21(9), 91-99


A. Arm and Wrist Analysis

Step 1: Locate Upper Arm Position:


 Step 1a: Adjust...
 If shoulder is raised: +1
 If upper arm is abducted: +1
 If arm is supported or person is leaning: -1
Upper Arm Score

Step 2: Locate Lower Arm Position:


 Step 2a: Adjust...
 If either arm is working across midline or out to side of body: Add +1
Lower Arm Score

Step 3: Locate Wrist Position:


 Step 3a: Adjust...
 If wrist is bent from midline: Add +1
Wrist Score

Step 4: Wrist Twist:
 If wrist is twisted in mid-range: +1
 If wrist is at or near end of range: +2
Wrist Twist Score


Step 5: Look-up Posture Score in Table A:
 Using values from steps 1-4 above, locate score in Table A.

Step 6: Add Muscle Use Score
 If posture mainly static (i.e. held 10 minutes),
 Or if action repeated occurs 4X per minute: +1
Muscle Use Score


Step 7: Add Force/Load Score
 If load < 4.4 lbs (intermittent): +0
 If load 4.4 to 22 lbs (intermittent): +1
 If load 4.4 to 22 lbs (static or repeated): +2
 If more than 22 lbs or repeated or shocks: +3
Force/Load Score

Step 8: Find Row in Table C
 Add values from steps 5-7 to obtain Wrist and Arm Score. Find row in Table C.
Wrist and Arm Score

B. Neck, Trunk, and Leg Analysis

Step 9: Locate Neck Position:


 Step 9a: Adjust...
 If neck is twisted: +1
 If neck is side bending: +1
Neck Score

Step 10: Locate Trunk Position:


 Step 10a: Adjust...
 If trunk is twisted: +1
 If trunk is side bending: +1
Trunk Score

Step 11: Legs:
 If legs and feet are supported: +1
 If not: +2
Leg Score

Step 12: Look-up Posture Score in Table B:
 Using values from steps 9-11 above, locate score in Table B.

Step 13: Add Muscle Use Score
 If posture mainly static (i.e. held 10 minutes),
 Or if action repeated occurs 4X per minute: +1
Muscle Use Score

Step 14: Add Force/Load Score
 If load < 4.4 lbs (intermittent): +0
 If load 4.4 to 22 lbs (intermittent): +1
 If load 4.4 to 22 lbs (static or repeated): +2
 If more than 22 lbs or repeated or shocks: +3
Force/Load Score

Step 15: Find Column in Table C
 Add values from steps 12-14 to obtain Neck, Trunk and Leg Score. Find Column in Table C.
Neck, Trunk & Leg Score

SCORES

Upper Arm	Lower Arm	Wrist Posture							
		1	2	3	4				
1	1	1	2	2	2	3	3	3	3
1	2	2	2	2	2	3	3	3	3
1	3	2	3	3	3	3	3	4	4
2	1	2	3	3	3	3	4	4	4
2	2	2	3	3	3	3	4	4	4
2	3	3	3	3	3	4	4	4	4
3	1	3	3	3	3	4	4	4	4
3	2	3	4	4	4	4	5	5	5
3	3	4	4	4	4	4	5	5	5
4	1	4	4	4	4	5	5	5	5
4	2	4	4	4	4	5	5	5	5
4	3	4	4	4	5	5	5	6	6
5	1	5	5	5	5	6	6	6	7
5	2	5	6	6	6	6	7	7	7
5	3	6	6	6	7	7	7	7	8
6	1	7	7	7	7	8	8	8	9
6	2	8	8	8	8	9	9	9	9
6	3	9	9	9	9	9	9	9	9

Neck Posture Score	Legs												
	1	2	3	4									
1	1	2	2	3	3	4	4	5	5	6	6	7	7
2	2	3	3	4	4	5	5	6	6	7	7	7	7
3	3	3	4	4	5	5	6	6	6	7	7	7	7
4	4	4	5	5	6	6	7	7	7	7	8	8	8
5	5	5	6	6	7	7	7	8	8	8	8	9	9
6	6	6	7	7	7	8	8	8	9	9	9	9	9

Wrist and Arm Score	Neck, Trunk & Leg Score						
	1	2	3	4	5	6	7
1	1	2	3	3	4	5	5
2	2	2	3	4	4	5	5
3	3	3	3	4	4	5	5
4	3	3	3	4	5	5	6
5	4	4	4	5	6	7	7
6	4	4	5	6	6	7	7
7	5	5	6	6	7	7	7
8	5	5	6	7	7	7	7

Scoring: (final score from Table C)
 1 or 2 = acceptable posture
 3 or 4 = further investigation, change may be needed
 5 or 6 = further investigation, change soon
 7 = investigate and implement change

Task name: _____ Reviewer: _____ Date: ____/____/____

This tool is provided without warranty. The author has provided this tool as a simple means for applying the concepts provided in RULA. © 2004 Neux Consulting, Inc. rbf@neuxconsulting.com (816) 444-1667

Figure 1. RULA Employee Worksheet (Mc Atmeney, 1993)