



EVALUATION OF PATIENT HANDLING'S WORK POSTURE AND MUSCULOSKELETAL DISORDERS OF NURSES IN ABC HOSPITAL

Silvi Rushanti Widodo¹, Sri Rahayuningsih²

Kadiri University¹²

Jl. Selomangleng No. 1, Pojok, Mojoroto¹²

E-mail: silvi@unik-kediri.ac.id¹, nuning@unik-kediri.ac.id²

ABSTRACT

The main problem for nurses that often causes complaints of musculoskeletal disorders is when carrying out patient appointments or patient handling. This is because the work performed varies depending on the needs of the patient. The purpose of this study is to determine the prevalence of symptoms of musculoskeletal disorders in nurses when removing patients from Hospital A. This study uses a cross sectional approach which is observational descriptive. The population of this study were all nurses at Hospital A. The sample taken was purposive sampling. The variables to be studied are the work posture of nurses when carrying out patient handling and complaints of musculoskeletal disorders. By measuring work posture using the RULA (Rapid Upper Limb Assessment) and REBA (Rapid Entire Body Assessment) methods. And complaints of musculoskeletal disorders are measured using the Nordic Body Map. The greatest percentage of body part complaints that nurses feel when lifting patients is in the lower back, which is 64%. The results of observations of work posture on average needed immediate improvement, but the most immediate changes to be made were in the patient placement section.

Keywords: musculoskeletal disorders, nurses, evaluation, RULA and REBA

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Address :

Jl. Urip Sumoharjo Km. 5 (Kampus II UMI)
Makassar Sulawesi Selatan.

Email :

Jiem@umi.ac.id

Phone :

+6281341717729

+6281247526640

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1. INTRODUCTION

The nurse's duties when caring for a patient often involve the physical nurse such as moving the patient to bed, moving the patient from bed to gurney, assisting patient mobility, holding body parts to dress, or tidying up the bed occupied by the patient (Menzel *et al.*, 2004). The high risk of symptoms of musculoskeletal disorders in nurses is recognized by nursing staff worldwide (Davis and Kotowski, 2015).

The main problem for nurses that often causes complaints of musculoskeletal disorders is when carrying out patient appointments or patient handling. This is because the work performed varies depending on the needs of the patient. And this nurse's work directly causes problems with musculoskeletal disorders (Lee, Lee and Gershon, 2015).

Musculoskeletal disorders or muscle injuries are complaints that are felt as a result of the continuous accumulation of small and large impacts and over a long period of time, causing pain and discomfort in the muscles, bones and joints. Hands, wrists, elbows, shoulders, neck, lower back, and feet are the parts of the body where complaints often occur (Kay, Evans and Glass, 2015).

In general, many symptoms of musculoskeletal disorders are caused by workers experiencing discomfort. Starting from this discomfort, it will gradually cause aches and pains in certain parts of the body. If left unchecked, aches and pains can lead to muscle injuries such as tendonitis, tenosynovitis, or serious nerve injuries such as carpal tunnel syndrome. Discomfort is a warning that the way of working in a job must be changed because it can affect a person's performance such as decreasing the quality of work caused by increasing mistakes made (Salvendy and Karwowski, 2021).

Therefore, so that a job does not cause muscle injury and excessive fatigue, the way of work must be arranged in such a way as to change work postures so that it is not monotonous, design a comfortable workplace, use supporting tools, and get enough rest (Salvendy and Karwowski, 2021).

The emergence of symptoms of musculoskeletal disorders can also occur due to a

lack of workers in understanding ergonomic principles. Ergonomics is a science that studies human behavior related to work carried out through adjusting work to body conditions in accordance with human capacities and abilities, utilizing it in designing jobs, products, workplaces, and work equipment (Dabaghi-Tabriz *et al.*, 2020).

Based on this background, this study aims to evaluate the work posture of nurses when carrying out patient handling as well as its relationship with the symptoms of musculoskeletal disorders experienced by nurses.

2. METHODS

This study uses a cross sectional approach which is observational descriptive. The population of this study were all nurses at Hospital A. The sample taken was purposive sampling.

The variables to be studied are the work posture of nurses when carrying out patient handling and complaints of musculoskeletal disorders. By measuring work posture using the RULA (Rapid Upper Limb Assessment) and REBA (Rapid Entire Body Assessment) methods. And complaints of musculoskeletal disorders are measured using the Nordic Body Map.

3. FINDINGS AND DISCUSSION

3.1. Nordic Questionnaire Data

The prevalence of muscle injury complaints among nurses uses the Nordic questionnaire when carrying out their work, especially when lifting patients (Dewi, 2020). Questions given to respondents contained complaints that nurses experienced when lifting patients in the last 6 months such as pain in the neck, right shoulder, left shoulder, right elbow, left elbow, right hand and wrist, left hand and wrist, back, back. groin, thighs, knees, feet and ankles. Table 1 is a recapitulation of the distribution of the Nordic questionnaires to nurses as a whole.

Table 1 Recapitulation of the Distribution of the Nordic Questionnaires

Total questionnaires distributed	22 pieces of questionnaires
Total Questionnaire Returns	22 pieces of questionnaires
Total questionnaires that can be processed	22 pieces of questionnaires
Response rate	100%

The first thing that is seen when processing the questionnaire data is to see the information filling in the respondent's data. Table 4.2 shows the grouping of respondents to fill out the Nordic questionnaire.

Table 2 Grouping of Respondents to Complete the Nordic Questionnaire

Data	Sub categories	Number (% of total subjects)
Gender	Man	32%
	Women	68%
Age	21-30 years old	18%
	31-40 years old	41%
	> 40 years old	41%
Time Working On Current Unit	< 1 years	0%
	< 5 years	45%
	> 5 years	55%

The processing of the Nordic questionnaire data was carried out by calculating the percentage of respondents who were in the "YES" group (having complaints) regarding body parts or prevalence. Respondents filled out the standardized Nordic questionnaire by using a scale of 0-10 with no pain, moderate pain, and very pain categories. Scale values included in the

"YES" group are those that fill in the range of values 5-10, while those that enter the "NO" group are those that fill in the range 0-4. The results of processing the data from filling out the Nordic questionnaire from all respondents (n = 22) can be seen in Figure 4.1 below:

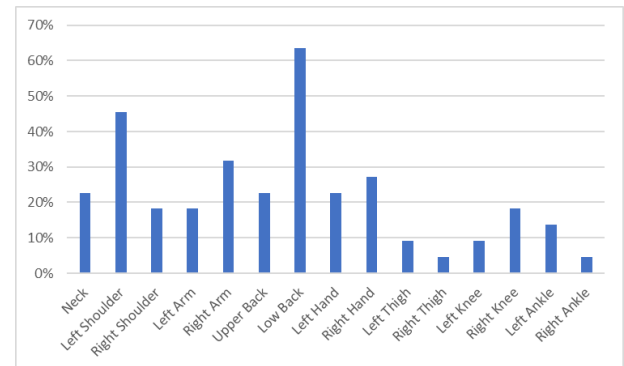


Figure 1 The results of filling out the Nordic Questionnaire

Based on the results of the questionnaire recap in Figure 1, it can be seen that since the last 6 months, the most common complaint experienced by respondents is the lower back, which is 64%. So it can be said that complaints on the lower back (low back) are the most disturbing complaints compared to complaints on other body parts.

3.2. Results of Observation and Assessment of Patient Handling Activities

The next stage after the patient handling activities have been successfully documented is the assessment of the work postures produced by nurses when carrying out patient handling activities. This documentation is carried out before and after the training is held to find out the success of the training on ergonomics in patient handling which is manifested in real daily actions. The instruments used to conduct an assessment of this work posture are RULA (Rapid Upper Limb Assessment) and REBA (Rapid Entire Body Assessment). This method is used to assess when a hospital nurse lifts and transfers a patient from bed to bed or vice versa.

3.2.1. Observation Results of Patient Handling Activities

In this study, the patient handling activities observed were when nurses lifted and transferred patients from bed to bed or vice versa, or from bed to bed. The process of appointing and transferring patients is divided into three main activities, namely:

1. Preparatory position. In this position, the patient is still lying in bed and the nurse

positions his body by placing his hands under the patient's body and preparing to lift him.

2. Lifting and moving position. In this position, the nurse is standing and doing the lifting and then starts walking towards the destination to place the patient.

3. Laying position. In this position, the nurse puts the patient to their destination, which can be smooth or another bed. The patient is still being lifted by the nurse.

3.2.2. Results of Assessment of Work Posture with RULA

1. Preparatory Position

Table 3 RULA Assessment Results for Preparatory Position

Part Body	Score	Adjustment	Total Score	Information
<i>Upper arm</i>	2	0	2	The upper arms form a 49.63° angle, the shoulders are not raised, and the arm is not supported.
<i>Lower arm</i>	2	0	2	Forearm shaping angle 67.48° .
<i>Wrist</i>	3	0	3	The wrist moves at an angle of -15° up to 15° .
<i>Wrist twist</i>	1	0	1	The wrists are in a straight position and not rotate.
<i>Neck</i>	2	0	2	The neck is bent at an angle of 16.07° without turning.
<i>Trunk</i>	3	0	3	Bent body position 50.84° without turning or bending left or right.
<i>Legs</i>	1	0	1	The body is well supported by the legs.
<i>Muscle use (upper body)</i>	0	0	0	The resulting muscle work is not static (retained for more than 1 minute), and is not repetitive (repeated more or less 4 times per minute).

So, the RULA score resulting from this preparatory position is as follows:

Table 4 RULA Grand Score in the Preparatory Position

RULA Section A	3
RULA Section B	4
Grand Score RULA	4

2. Lifting and Transferring Positions

Table 5 Results of RULA Assessment of Appointment and Transfer Position

Part Body	Score	Adjustment	Total Score	Information
<i>Upper arm</i>	1	0	1	The upper arms form a very small angle so that it is assumed to be 0°, the shoulders are not lifted, and the arms are not supported.
<i>Lower arm</i>	1	0	1	Forearm shaping angle about 90°.
<i>Wrist</i>	3	0	3	The wrist moves at an angle of -15° up to 15°.
<i>Wrist twist</i>	1	0	1	The wrists are in a straight position and do not rotate.
<i>Neck</i>	1	0	1	The neck does not bend so that the angle is 0° without rotating.
<i>Trunk</i>	2	0	2	Slight body position bends at a 10°-20° angle and does not rotate or bend to the left or right.
<i>Legs</i>	1	0	1	The body is well supported by the legs.
<i>Muscle use (upper body)</i>	1	0	1	The resulting muscle work is static (holds for more than 1 minute) when lifting and patient transfer.
<i>Muscle use (lower body)</i>	0	0	0	The resulting muscle work is not static (retained for more than 1 minute), and is not repetitive (repeated more or less 4 times per minute).
<i>Load (upperbody)</i>	3	0	3	In the lifting and transferring position, the nurse lifts a patient who weighs more than 10 kg and is static (held for more than 1 minute) while make transfers.

<i>Load (lower body)</i>	1	0	1	The load received by the lower body is small. Because the load that is lifted is more than 10 kg so that the lower limbs will receive a load of around 2-10 kg and are intermittent.
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So, the RULA score resulting from this appointment and transfer position is as follows:

Table 6 RULA Grand Score in Lifting and Transferring Positions

RULA Section A	6
RULA Section B	3
Grand Score RULA	5

3. Laying Position

Table 7 Results of RULA Position Position Assessment

Part Body	Score	Adjustment	Total Score	Information
<i>Upper arm</i>	3	0	3	The upper arms form a 46°.44° angle, the shoulders are not raised, and the arm is not supported.
<i>Lower arm</i>	2	0	2	The forearm forms an angle of 71.56°.
<i>Wrist</i>	3	0	3	The wrists move over an angular range of -15° to 15°.
<i>Wrist twist</i>	1	0	1	The wrists are in a straight position and not turning.
<i>Neck</i>	2	0	2	The neck is bent at an angle of 12.31° without turning
<i>Trunk</i>	3	0	3	Body position bent 40.30° without turning or bending to the left or right.
<i>Legs</i>	1	0	1	The body is well supported by both feet.
<i>Muscle use (upper body)</i>	0	0	0	The resulting muscle work is not static (retained for more than 1 minute), and is not repetitive (repeated more or less 4 times per minute).
<i>Muscle use (lower body)</i>	0	0	0	The resulting muscle work is not static (retained for more than 1 minute), and is not repetitive (repeated more or

				less 4 times per minute).
<i>Load (upperbody)</i>	3	0	3	At the time of placing the patient, the nurse is still in a state of lifting and will lay down so that the load being lifted is still more than 10 kgs.
<i>Load (lowerbody)</i>	1	0	1	The load received by the lower body is small. Because the load that is lifted is more than 10 kg so that the lower limbs will receive a load of around 2-10 kg and are intermittent.

Table 8 RULA Grand Score in Laying Position

RULA Section A	7
RULA Section B	5
Grand Score RULA	7

3.2.3. Results of Work Posture Assessment with REBA

1. Preparatory Position

Table 9 Results of REBA Assessment for Preparatory Position

Part Body	Score	Adjustment	Total Score	Information
<i>Neck</i>	1	0	1	Neck down at an angle 16.07° without turning
<i>Trunk</i>	3	0	3	Bent body position 50.84° without turning or bending left or right.
<i>Legs</i>	1	0	1	The body is well supported by both feet.
<i>Upper arm</i>	2	0	2	The upper arms form a 49.63° angle, the shoulders are not lifted, and the arms are not supported.
<i>Lower arm</i>	2	0	2	Forearm shaping angle 67.48°.
<i>Wrist</i>	2	0	2	The wrist moves at an angle of -15° up to 15°.
<i>Load</i>	0	0	0	In the preparation position, the nurse has not lifted the

				patient, so the burden is lifted assumed to be 0 kg.
<i>Coupling Score</i>	1	0	1	Handle is acceptable but not ideal. In this case, the nurse uses the patient's body as handle.
<i>Activity Score</i>	0	0	0	The resulting work posture is not static (holds on for more than 1 minute), and is not repetitive (repeated more or less 4 times per minute).

Table 10 REBA Grand Score in Preparation Position

REBA Section A	2
REBA Section B	4
Grand Score REBA	3

2. Lifting and Transferring Positions

Table 11 Results of REBA Assessment of Position of Appointment and Transfer

Part Body	Score	Adjustment	Total Score	Information
<i>Neck</i>	1	0	1	The neck is not bent so that the angle is 0° without turn.
<i>Trunk</i>	2	0	2	The position of the body is slightly bent to form an angle of 10°-20° and does not rotate or bend to the left or right.
<i>Legs</i>	1	1	2	The body is well supported by both feet. But when moving the patient, the feet do changes while running.
<i>Upper arm</i>	1	0	1	The upper arms form a very small angle so that it is assumed to be 0o, the shoulders are not raised, and the arms are not sustained.
<i>Lower arm</i>	1	0	1	The forearm forms an angle of about 90°.

<i>Wrist</i>	2	0	2	The wrists move over an angular range of - 15° to 15°.
<i>Load</i>	2	0	2	In the lifting and transferring position, the nurse lifts a patient who weighs more than 10 kg kg.
<i>Coupling Score</i>	1	0	1	Handle is acceptable however not ideal. In this case, the nurse uses the patient's body as handle.
<i>Activity Score</i>	1	0	1	The position of the nurse when carrying out the lifting and moving of the patient is that the load is held for more than 1 minute and the movement causes a change quickly from the initial posture.

Table 12 REBA Grand Score in Lifting and Transferring Positions

REBA Section A	5
REBA Section B	3
Grand Score REBA	5

3. Laying Position

Table 13 Results of REBA Assessment of Laying Positions

Part Body	Score	Adjustment	Total Score	Information
<i>Neck</i>	1	0	1	The neck is bent at an angle of 12.31° without turning
<i>Trunk</i>	3	0	3	Bent body position 40.30° without turning or bending left or right.
<i>Legs</i>	1	0	1	The body is well supported by both feet.
<i>Upper arm</i>	3	0	3	The upper arms form a 46.44° angle, the shoulders are not raised, and the arm is not supported.
<i>Lower arm</i>	2	0	2	Forearm shaping angle 71.56°.
<i>Wrist</i>	2	0	2	The wrists move over an angular range of -

				15° to 15°.
<i>Load</i>	2	0	2	In the laying position, the nurse is still in a state of lifting the patient to be placed so that the load received is the same as the load when lifting, namely more than 10 kg.
<i>Coupling Score</i>	1	0	1	Handle is acceptable however not ideal. In this case, the nurse uses the patient's body as handle.
<i>Activity Score</i>	0	0	0	The resulting work posture is not static (holds on for more than 1 minute), and is not repetitive (repeated more or less 4 times per minute).

Table 14 REBA Grand Score in Laying Position

REBA Section A	4
REBA Section B	6
Grand Score REBA	6

4. ANALYSIS

4.1 Analysis of Musculoskeletal Disorders Complaints

Data related to muscle injury complaints were obtained through a Nordic questionnaire which was distributed to nurses who carry out patient handling activities. From the questionnaire, it was recapitulated and the results obtained were that the percentage of complaints on the body part of the lower back (low back) was 64%. So it can be said that complaints on the lower back (low back) are the most disturbing complaints compared to complaints on other body parts. This is in accordance with research conducted by (Tosunoz and Oztunc, 2017) that on average nurses who carry out patient handling activities experience lower back pain. The left shoulder and

right arm are also parts of the body that have a fairly high prevalence, with more than 30%.

Broadly speaking, the causes of nurses experiencing muscle injuries in certain body parts when lifting patients are (Ribeiro, Serranheira and Loureiro, 2017):

- Patients with varying weights. Starting from patients who are thin, normal, or fat and even some who are overweight. The load that is lifted and moved will be greater if the patient's weight is also heavier (Hilmer *et al.*, 2007).
- Patient handling activities are carried out continuously so that it can cause nurses to be susceptible to muscle injuries (Bernal *et al.*, 2015).
- The condition of the body that is not ready when lifting and moving patients so that the muscle system experiences a sudden

increase in load and is not flexible (Mayeda-Letourneau, 2014).

- d. Incorrect technique when lifting and moving the patient. In lifting and moving patients manually, it is necessary to provide knowledge and training related to ergonomic principles when carrying out patient handling activities because if an error occurs when lifting and moving patients, the danger is not only felt by the nurse but also felt by the patient (Adje *et al.*, 2019).

4.2 Analysis of Work Posture Observation Results

4.2.1 RULA

Observation of patient handling activities gets the final results, namely:

1. Preparatory position. In this position, the RULA Grand Score gets a final result of 4 where this position requires a review and changes may be needed.
2. Lifting and moving position. In this position, the RULA Grand Score gets a final result of 5 where this position requires a review and changes must be made immediately.
3. Laying position. In this position, the Grand Score of RULA gets a final score of 7 where this position indicates a very dangerous activity that requires inspection and changes must be made immediately.

4.2.2 REBA

Observation of patient handling activities gets the final results, namely:

1. Preparatory position. In this position, the REBA Grand Score gets a final result of 3 where this position needs to be reviewed and changes may be needed.
2. Lifting position. In this position, the REBA Grand Score gets a final result of 5 where this position requires a review and changes must be made immediately.
3. Laying position. In this position, the REBA Grand Score gets a final result of 6 where this

position requires a review and changes must be made immediately.

5. CONCLUSION

1. The greatest percentage of body part complaints that nurses feel when lifting patients is in the lower back, which is 64%.
2. The results of observations of work posture on average needed immediate improvement, but the most immediate changes to be made were in the patient placement section.

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