The Influence of Manual Patient Handling Nitilin Kit For The Nurses Towards The Potential Risk And Complained Of Musculoskeletal Disorders (MSDs) of Muji Rahayu Hospital

Dwi Nisa Widhawati¹, Tjipto Suwandi², Linda Dewanti³

¹Magister of Occupational Health and Safety, Airlangga University, Surabaya, Indonesia

²Departement of Occupational Health and Safety Public Health, Airlangga University, Surabaya, Indonesia,

³Medical of Faculty, Airlangga University, Surabaya, Indonesia

Abstract: The influence of manual patient handling NITILIN kit towards the risk and complaints of Musculoskeletal Disorders (MSDs) for the nurses of Muji Rahayu Hospital. The research was done by using Quasi Experimental design. The samples of the research is nurses serving at Emergency Room, Space Operations Surgery, and Inpatient room in Muji Rahayu Hospital Surabaya. The sampling technique was done by using the total of treatment replications from the 3 units. Data collection was done by direct observation of REBA calculation method with videos and photos, and using Nordic Body Map assessment table instrument. Data was analysed by using descriptive statistic and paired t-test. Analysis with paired t-test showed that there are significant difference between body posture assessment before and after using the manual handling tool (p < 0.000), and complaints agains MSDs before and after using the manual handling tool (p < 0.000). Analysis with Kruskal-Wallis test comes with the result of significant difference before using the tool with REBA methode, however, no difference was found on post-test. There appears to be a difference between the 3 units and gender comparison. Manual patient handling NITILIN tool proven to improve the body posture with risk of MSDs from high to low, especially in the Emergency Room which require high patients mobilization.

Keywords: MSDs, Manual Patient Handling Nitilin, Manual handling, REBA, Nordic Body Map

1. Introduction

Ergonomic exposure in health service can be experience by nurse. According to Dedy Roslan (1996) there are eight tasks generally should be done by nurse namely work attitude in working with ergonomic risk, one of then return the patient in the bedroom, turning the patient (¹/₄ position), laterally move patients out of bed to a wheelchair, pushed the bed and wheelchair, move the patient from bed to chair usual, bring / help patients move from chair to toilet, transferring patients from wheelchair to the car and vice versa, and help the patient to walk.

Lifting the patient is an activity that requires physical labor quite heavy, as heavy patient load varies, the duration of time that tends to be done as soon as possible. Although it was carried out together but because of the technique as well as the load is lifted unstable resulting in a potential risk for the occurrence of musculoskeletal disorders (Musculoskeletal Disorders) is quite high.

According to the results of research at the Cleveland Clinic Hospital and 22 Hospitals in Ohio (1993-1996) in the United States, most found sprain and strain injuries in nurses. Back pain (back injuries) is the most complaints from the injury and more befall female nurses. The cause is often static muscle work, such as lifting the patient and rotating work (Wichaksana, 2002).

Research Klein (1984), nurses are in ranking fifth among all workers compensation claims for back injuries severe worker only the highest rank (Klein, et al, 1984). Complaints of injury to a hospital nurse, almost two times higher than industrial workers. The results of the questionnaire revealed that 38% of 503 respondents of nurses suffered severe back pain associated with his work. 20% of back pain is said that they have moved on to other units to reduce physical stress eg lifting, carrying and transferring patients. 12% percent of respondents considering moving work to other units, and another 12 percent said they think to leave the nursing profession, because back pain is experienced as a result of his work. Another study in the UK, found 12% of all nurses intend to leave the profession as a nurse for good, as well as pain / back pain as a major contributing factor (Owen, 2008).

Emergency Unit is a part of the first places visited by the patient when he wants to get first aid, thus in this unit care and treatment services have been started when the patient entered. Activity implementation of manual handling is usually done by nurses. Manual handling is any activity that requires effort and performed by nurses to lift, lower, push, pull, move, hold, and hold the patient. Activities include putting on clothes, moving from the bed, moving from the chair, moving from one place to another, helped to the toilet, bathing and others (Nurses Association and WorkCover, 1998).

Nurses work load based on calculations derived from the training ward head Nursing Adi Husada Surabaya (2014) that

the need for personnel to the emergency room nurses with patient visits ideally is 1: 4, but in the hospital. Muji Rahayu obtained comparisons between nurse and patient visits is 1: 5, in this case between the needs of nurses and patient visits are not so problematic though slightly increased.

RSMR nurses in the workforce often accept new patients come with a private car or public use where the positions of the patient were in the car. Constraints that happens is that the patient's condition is less cooperative when moving the position of the patient from the car to brancard, so that when moving the patient, the officer requires extra energy so often occurs due to MSDs complaint narrow and difficult position.

This condition drives the desire to modify the manual patient handling aids NITILIN by adjusting anthropometry officers, resulting in the transfer of patients from brancard to bed can be done easily and without using a lot of power so that work more effectively and efficiently. The purpose of this study is identifying the effect of the modification tools NITILIN manual patient handling by adjusting anthropometry of the complaints officer and nurse in hospital MSDs risk Muji Rahayu

2. Materials and Methods

This research includes studies using Quasi-Experimental design. Design Quasi-Experiment (The one-group pretest-posttest design)



Time of observation

REBA and NBM 1 REBA and NBM 2 Description:

- X : The provision of treatment
- O1 : Measurement pretest
- O2 : Measurement posttest

Location of the study conducted at the hospital. Muji Rahayu in the ER room, OK, Inpatient Adult. The study was conducted during the period 2014-2015. Based on the calculation of the total treatment replication sample of 18 respondents obtained, but because of the limited number of respondents found the number 16.

Data was collected by means of observation and measurement of pre and post REBA, interviews using questionnaires Nordic Body Map. Data analysis was performed bivariate test paired t test and Kruskal-Wallis.

3. Results

| Characteristic | n=16 | Total (%) | Mean \pm SD |
|----------------|------|------------|---------------|
| Age | | | 24±1,5 |
| Gender | | | |
| Male | | 5 (31,3%) | |
| Female | | 11 (68,8%) | |

| Service Of Years : | 1,25±0,447 | | |
|--------------------------|-----------------------------------|--|--|
| Nursing Education D3 | 14 (87,5%) | | |
| Body Mass Index | 2(12,5%) 23,5 ± 4,1 | | |
| Thin Normal Fat | 3 (18,8%) 8 (50,3%) 1(6,3%) | | |
| Obese Pastimes Sports | 4(25%) | | |
| Never rarely Often | 2(12,5%) 12 (75%) 2(12,5%) | | |

Based on the results of the distribution of respondents note that the average age of respondents was 24 years old with the highest female gender and the average service life of 1 year. Type D3 minimal education and respondents seldom sporting activities.

Test Differences Posture Before and After Wearing Tool (REBA)

Before the test the difference, first tested for normality using the Kolmogorov-Smirnov, if obtained p value> 0.05 (p> 5%) means that the data are normally distributed, then followed by using the paired t test to compare between pre and post test.

| Table 2: Differences Assessment Test Posture Before and |
|--|
| After Using Tools |

| | | DEI | 2 4 | | Dofforant | | |
|-----------------------|-------------|------------------|-------------------|------------------------|--------------|--|--|
| ¥7 · 11 | | KEI | | Defference REBA (Λ) | | | |
| Variable | n | Mean | ±SD | | Test Pre | | |
| n = 16 | | PRE | POST | Mean+SD | & post | | |
| | | | | Wiedil-5D | (<i>p</i>) | | |
| Work Unit | | | | | | | |
| OK = | 3 (18,8%) | $10,33 \pm 0,58$ | $2,\!67\pm0,\!44$ | $7,66 \pm 0,16$ | 0,011 | | |
| IGD = | 4 (25%) | 10,50±1,29 | 2,92±0,56 | $7,58\pm0,98$ | 0,020 | | |
| Inpatient= | = 9 (56,3%) | 9,00±1,12 | 2,94±0,39 | 6,06±1,30 | 0,001 | | |
| Total | 16(100%) | 9,63 ±1,26 | 2,89 ±0,43 | 6,74 ±1,32 | < 0,000 | | |
| | | Gen | der | | | | |
| Male | 5 (31,1%) | $10.40\pm0,54$ | 2,59±0,38 | 7,80±0,21 | < 0,000 | | |
| Female | 11(68,8%) | 9,27±1,35 | 3,02±0,39 | 6,26±1,33 | < 0,000 | | |
| | | Body Ma | ss Index | | | | |
| Thin | 3 (18,8%) | 9,00±1,00 | 3,05±0,39 | 5,95±0,69 | 0,004 | | |
| Normal | 8 (50%) | 9,63±1,41 | 2,92±0,48 | 6,71±1,47 | < 0,000 | | |
| Obese | 5 (31,2%) | $10,00\pm 1,41$ | 2,83±0,36 | 7,17±1,46 | 0,002 | | |
| Pastimes Sports | | | | | | | |
| Rarely | 14(87,5%) | 9,42±1,31 | 2,99±0,44 | 6,43±1,33 | < 0,000 | | |
| Often | 2 (12,5%) | 10,50±0,71 | 2,58±0,35 | 7,92±0,34 | 0,020 | | |
| frequency appointment | | | | | | | |
| < 5 | 4 (25%) | 8.50±0,58 | 2,96±0,32 | 5,54±0,.77 | 0,001 | | |
| 5 - 10 | 7 (43,8%) | 9,75±1,39 | 2,94±0,51 | 6,81±1,41 | < 0,000 | | |
| > 15 | 5(31,2%) | $10,50\pm0,58$ | 2,71±0,37 | 7,79±0,28 | < 0,000 | | |

According to the above table looked there was significant difference between posture assessment before and after use assistive devices.

Test comparisons made use of tools in the ER room before taking the risk of musculoskeletal disorders tool has the largest with an average score of 10.50, amounting to 4 respondents (25%) and the least risk of MSDs in the inpatient

room with a total of 9 respondents (56.3 %) with a score of 9.00, while after using the tool appears there is a decrease in the assessment of posture but in space inpatient room has the largest posture assessment with a score of 2.94, while most existing reduction in the operating room with a score of 2.67.

Based on the different test by a factor of sex, it appears that prior to use the tools of men have the highest risk compared to women with a score of 10.40 whereas that after using the tool seems that men have a decreased risk of MSDs to its lowest score of 2.59 than women.

MSDs risk assessment based on nutritional status, it appears that prior to use the tools of risk occurrence of MSDs are the most obese respondents with a score of 10.00, while the thin respondents at risk of MSDs with a score of 9.00. After using the tool looks of the respondents have more fat than the smallest risk skinny or normal.

Assessment of factors sports craze, it appears that sports fans have the highest risk for MSDs with a score of 10.50, but once treated it appears that the greatest reduction contained in the sports enthusiast with a score of 2.58.

Based on the frequency of the appointment appears that the more frequent lifting activities have the highest risk of MSDs complaint with a score of 10.50 and the least risk to respondents who frequency <5 is the score 8:50, whereas after the given tools of risk reduction is greatest in those who making the appointments with a frequency> 15 is the score 2,71.

Complaints Differences test Musculoskeletal Disorders Before and After Wearing Tool (Nordic Body Map) Same with the REBA measurements above to test normality using the Kolmogorov-Smirnov method, whereas the comparison test with paired t test to compare the complaints MSDs between pre and post tests.

 Table 3: Differences measurement MSDs complaint with the method of Nordic Body Map

| | | NB | M | | Defferent | | |
|-----------------|-----------|-------------|------------|-------------------|--------------|--|--|
| | | Mean | ±SD | Defference | Test | | |
| Variable | n | PRE | POST | NBM (Δ) | Pre & | | |
| | | | | Mean±SD | post | | |
| | | | | | (<i>p</i>) | | |
| Work Un | it | | | | | | |
| OK | 3 (18,8%) | 60,67±6,11 | 41,61±3,31 | 19,06±3,53 | 0,011 | | |
| IGD | 4 (25%) | 61,25±7,89 | 37,25±5,73 | $24,00\pm10,55$ | 0,020 | | |
| Inpatient | 9 (56,3%) | 60,89±19,07 | 33,11±4,34 | 27,78±17,50 | 0,001 | | |
| Total | 16(100%) | 60,94±14,54 | 35,74±5,45 | 25,19±14,11 | <0,000 | | |
| | | Ge | nder | | | | |
| Male | 5 (31,1%) | 63,80±14,39 | 39,57±3,66 | 24,23±15,94 | 0,027 | | |
| Female | 11(68,8%) | 59,64±15,10 | 34,00±5,34 | $25,63{\pm}14,02$ | <0,000 | | |
| | | Body M | ass Index | | | | |
| Thin | 3 (18,8%) | 71,33±9,02 | 35,67±6,80 | 35,67±2,89 | 0,002 | | |
| Normal | 8 (50%) | 57,88±14,69 | 34,63±6,12 | 23,25±14,26 | 0,002 | | |
| Obese | 5 (31,2%) | 61,00±18,71 | 37,71±4,64 | 23,29±19,22 | 0,094* | | |
| Pastimes Sports | | | | | | | |
| Rarely | 14(87,5%) | 64,58±14,78 | 35,90±5,31 | $28,68 \pm 14,75$ | <0,000 | | |
| Often | 2 (12,5%) | 55,50±2,12 | 40,50±4,94 | 15,00±2,83 | 0,084* | | |

Based on the data above, we see that the highest MSDs complaint before using the tools contained in the respondent in the ER room with a value of 61.25 (medium) and the lowest in the operating room is 60.67 (medium) but after using the tool there is a decrease in the space of the biggest complaints Inpatient room with the value of 33.11 (low) and there are complaints that high in the room was OK with the value of 41.61 (low). The biggest complaint in get in respondents with male sex than women, after using this tool helped by the significant decrease between the sexes.

The highest complaint before using tools based on body mass index (BMI) of respondents found on skinny with 71.33 and the lowest value in a normal person with a value of 57.88, whereas after treatment given tools are the biggest complaints decline in respondents with a normal nutritional status 34.63 value. Respondents with fat nutritional status it is not significant that the value of 37.71 and p value 0.094.

Respondents who do not like sports, before use tool has the highest MSDs complaint with the value of 64.58 and but after using a significant decrease in the value of 28.68, and it is not significant. A respondent who likes sport has a value of 55.50 into 40.50 with p value 0.084.

The diagram below illustrates the grouping level of complaints of musculoskeletal disorders of all respondents who aim to distinguish the level of complaints of musculoskeletal disorders if there is a difference between before and after the wearing tool wear. Which as you can see below:





According to the diagram above that it appears that prior to use the tools of the biggest complaints is on the shoulders of 50%, 62.5% arm, elbow 50%, and waist 56%, while after using the tools seem a decline in complaints in all parts of the body. The biggest complaint that can still be felt there on the shoulder 25%, 6% arm, and the back of 12.5%.

Benefits of Using Different Test Tool Based on the space between the Pre and Post REBA

The purpose of this test is to find a comparison of benefits for each room. Normality test conducted by Shapiro-Wilk, generated data that is not normal that followed the Kruskal-Wallis test appeal among 3 spaces and produced one of the rooms that did not come out the value followed by Mann-Whitney test. Results statistics below:

 Table 4: Test Comparison between load removal benefits

 Work Unit

| Work Unit | | | | | | |
|-----------|---|---------------------|------------------------|-------------------------|--|--|
| | n | Ranks | p (Kruskal- Wallis) | Information | | |
| | | F | REBA Pre | | | |
| OK | 3 | 11,00 ^{ab} | | There is a significant | | |
| IGD | 4 | 12,25 ^b | 0,044 | difference | | |
| Inpatient | 9 | 6,00 ^a | | | | |
| REBA Post | | | | | | |
| OK | 3 | 6,67 | | There is no significant | | |
| IGD | 4 | 8,88 | 0,664 | difference | | |
| Inpatient | 9 | 8,94 | | | | |

Description : alphabet a and b are the same if not show any difference

According to the above data it appears that prior to using the tool looks REBA pre-existing differences in the risk of musculoskeletal disorders were significant between the ER room and Inpatient After using the tool looks REBA post between the three rooms there was no difference in the risk of musculoskeletal disorders meaningful. On the difference between pre and post REBA appears that there appears to be a significant difference from the ER room and different test Inpatient.

Nordic Lounge Pre and Post Body Map The purpose of this test is to differentiate the level of complaints from each room.

Table 5: Complaints Musculoskeletal Disorders different test

 between the room with Nordic Body Map

| | | | <u> </u> | | |
|-----------|---|------------|--------------------|-------------|--|
| Work unit | n | Ranks | p (Kruskal-wallis) | information | |
| | | | | | |
| OK | 3 | 9,50 | | | |
| IGD | 4 | 9,38 | 0,787 | TT1 . | |
| Inpatient | 9 | 7,78 | | inere is no | |
| | | difference | | | |
| OK | 3 | 14,17 | | difference | |
| IGD | 4 | 6,0 | 0,058 | | |
| Inpatient | 9 | 7,72 | | | |

According to data from the table above it appears that among the three rooms before and after using the tool no difference complaints musculoskeletal disorders significantly.

Different test Workload based Frequency and Gender

 Table 6: Test of Different Workload based Frequency and Gender

| Variable | REBA | | Activity | REBA x freq (Work Load) | | | |
|---------------|------|------|----------|-------------------------|-------|------|-------|
| | Pre | Post | Freq. | Pre | р | Post | Р |
| Unit Kerja | | | | | | | |
| OK | 10.3 | 2.6 | 15 | 154.5 | | 39 | |
| IGD | 10.5 | 2.9 | 10 | 105 | | 29 | |
| Inpatient | 9 | 2.9 | 5 | 45 | 0,03 | 14.5 | 0,09 |
| Jenis Kelamin | | | | | | | |
| Male | 10.4 | 2.6 | 13 | 135.2 | | 33.8 | |
| Female | 9.3 | 3 | 6 | 55.8 | 0,017 | 18 | 0,057 |

According to the table above is based on the frequency of the workload in get that, before using the appliance load difference between the room into three, namely between OK and different ER load with Inpatient. After using the tool obtained similar results are OK and the ED have different loads with Inpatient. Different test load on gender in get before using the tool there is a difference between men and women, while in the post did not appear different from the load between men and women.

4. Discussion

The transfer of patients do with posture that is not natural or forced and high muscle activity occurs in the body of the waist, shoulder, and arm. This can pose a risk of injury. Removal process requires minimal power 4 nurses and even still in need of the assistance of the patient's family. Unstable patient load that MSDs complaints that occur every person is also not the same depending on the weight of the patient, not to mention if patients struggling or rocking at the moment will be moved. This raises the idea to design a tool manually handling the transfer of patients.



The tool consists of a mat or sliding sheet placed under the patient's body as bedding. The mattress size that is at the center of the measuring 60 cm and left and right side there is a handle to grip the nurse to facilitate attract patients to the destination. Handle is provided respectively at 3 locations are: upper, middle, and bottom.





Image Sliding Board

Sliding Board is a board made of fiberglass Kevlar and placed just below the patient's back, which serves as a bridge and a lubricant between the friction mats and boards. The way the device is a bed and bran card align, place it under the mattress in the patient's body and then sliding board in place under the mat as a bridge between the bed and bran card, and last drawn. The transfer of patients in general before using the tool is done by lifting the patients who underwent minimal by 4 people, while using tools made pretty by 2 nurses. From the research before taking the manual handling aids measured from posture (REBA), including a high level of risk, while after using the tool to cut the risks to be low.

Complaints from the Nordic Body Map it appears that prior to use tools in general the respondents give the perception of MSDs complaint with category while after using the tool complaints decreased to low. Description Tarwaka, et al. 2004 says that MSDs is not a clinical diagnosis but a label for the perception of pain or pain in the musculoskeletal system, so that experienced nurses MSDs complaint depends on the perception of pain they experienced.

Posture assessment results based on the room, OK and IGD has a tendency highest potential risk of MSDs, According Syaer, (2011) that the ER nurse and OK compared Inpatient room is required to have more capability in terms of dexterity, skill and alertness, but after using the tools They get a significant decrease between the third room.

So also with the results of the assessment of Nordic Body Map between before and after using the tool there is a decrease in the perception of MSDs complaints from three to the room. Several studies that gender significantly affect the level of risk of muscle complaints. This is physiological; muscle ability of women was lower in comparison with male muscle. Research results Chiang et al, 1993, Bernard et al, 1994, Hales et al, 1994, and Johnson, 1994 states that the ratio of muscle men and women is 1: 3.

The results based on gender, that men of a very high level of risk and after using the tool into a low score, while for female respondents from the high level of risk into the moderate risk level and p value <0.001 so in this case means that there are

significant differences for difference between the sexes, which means that the tool can be used by both sexes.

While the level of complaints by NBM can be seen from sex are the most significant decline in complaints on the female gender of a complaint being brought down by p value <0.000 while the male p value 0.027. This indicates that after using these tools can help reduce complaints MSDs for all genders.

Assessment of Posture Nurses (REBA), it appears that obese and very obese people have a tendency of posture that has the highest risk of MSDs than normal or poor nutritional status, but after using the tool decreased significantly, so that the tool can be used by various nutritional status.

Skeletal complaints NBM based assessment methods are average in obese people no differences were significant p value (0.094). This can be caused in a person's perception of the complaint is not the same and the number of respondents who are very overweighting (obese) is less than 5 people.

Although it has a very small factor, weight and body mass have factors that can cause skeletal muscle complaints. Vessy, et al (1990) suggests that women who are obese are at risk of 2X compared with lean women, especially for leg muscles. . Other findings stated that the higher body generally often suffers from back pain complaints, but high body does not have an influence on the complaints of the neck, shoulders and wrists.

Explanation of Tarwaka et al, (2004), if we look closely, skeletal muscle complaints related to body size is due to the equilibrium structure in order to receive the load, whether it is weight of the body as well as other extra heavy loads. For example, higher body generally has the form of a slender bone biomechanics thus vulnerable to pressure load and prone to bending loads, therefore, have a higher risk of the occurrence of muscle complaints.

From the results of research based assessment REBA method appears that respondents sports fans have the potential risks to the highest MSDs compared with respondents who rarely exercise with high category. This is because the number of respondents who often sports only 2 people and score are 10 and 11, while the remaining 14 respondents are rarely exercise, and after using the tools found that respondents with a rare exercise significant decrease p value <0.000 compared to the likes sports with p value of 0.020. This confirms that these tools can reduce risk and improve your posture is good for nurses who like to exercise or not.

NIOSH reports quoted from research Cady et al, 1979, stated that for body fitness level is low, and then the level of risk of complaints is 7.1%, the rate being 3.2% freshness and high freshness weeks to 0.8%. It can be underlined that the low level of freshness that will affect the occurrence of muscle complaints.

The results of the study with assessment REBA method described that high and medium frequency has a value of REBA score very high category when not wearing hearing aids, while after using the manual handling are decreased to a

low category. Judging from the results of p value at <0.05, the difference for the greater high frequency losses, and the standard deviation is narrow it indicates that the more frequent use of this tool, the closer to the ideal posture as more accustomed to use.

Based on the analysis using the Kruskal-Wallis and Man-Whitney, that before using the tool looks REBA pre-existing differences in risk of musculoskeletal disorders were significantly between the ER and Inpatient, while after using the tool does not seem significant differences between the three rooms. Disorders of musculoskeletal complaints comparison between the rooms with Nordic Body Map, that between the three rooms with a given tool manual handling complaints no significant difference.

The statistical results of the multiplication of the frequency of the appointment with the score posture was found that the burden is highest in the room was OK, because in the operating room more often to move the patient from the start to the admin area (handover of patients between space) through to the sterile room, even in the recovery room, so that the potential risk of MSDs higher than other parts, followed by the ER room. Inpatient has the least load.

Based on an assessment of gender in getting that before using the tool there is a difference between men and women's burden, but after using the tool was no difference between the two. This is because in a position to move into the same patient in a position that is as towing loads.

5. Conclusion and Acknowledgements

Suitability tool to anthropometric average nurse is in conformity with the view scores decreased to a low posture, there are still some who have moderate scores for height and short range. The measurement results (REBA) manual patient handling aids NMR can help improve posture nurse when transferring patients from an average high risk potential becomes low risk.

Based on the results of measurements of complaints musculoskeletal disorders (Nordic Body Map) before using the manual patient handling aids NMR appears that the average complaint rate medium category, and after using the tools decreased average low category.

NMR manual patient handling tools proven to improve posture nurses from low to high risk, as well as complaints of moderate to high MSDs, especially in the emergency room and OK for high patient mobilization.

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