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Reducing Musculoskeletal Disorders: Ergonomic Interventions in Hospital Staff Workspaces

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Abstract: This study aimed to analyze the risk factors for musculoskeletal disorders (MSDs) among hospital staff at Mitra Medika Bondowoso Hospital and provide recommendations for improvement. Using a qualitative descriptive observational approach, we employed the Quick Exposure Checklist (QEC) method to assess the risk exposure of MSDs in a sample of six hospital staff members across various roles. Our findings indicated that cervical disc disorders and low back pain were prevalent among respondents, with contributing factors such as inadequate safety devices, damaged equipment, dangerous procedures, and unsafe storage areas. Based on QEC results, all respondents were classified as needing immediate action (level 3), with one respondent requiring additional trolley availability and ergonomic adjustments (level 2). To mitigate MSD risks, we recommend the provision of ergonomic improvements such as chair cushions, arm pads, adjustable tables, and modified storage solutions, as well as the addition of trolleys for transporting medical records. Implementing these changes could enhance staff well-being and workplace safety in healthcare settings globally.

Keywords: musculoskeletal disorders, Quick Exposure Checklist, hospital staff, ergonomics, workplace safety

Introduction

The Occupational Health and Safety Council of Ontario (OHSCO) in 2007 stated that musculoskeletal disorders are a series of pains in the tendons, muscles, and nerves. Activities with a high repetition rate can cause tissue damage, pain, and discomfort in the muscles. Musculoskeletal Disorders can occur even though the force exerted is light and the work posture is satisfactory (For & Future, 2010).

Various researches show that the complaints of diseases often suffered by workers are musculoskeletal disorders, which are influenced mainly by the work position. Work position refers to how the posture is carried out. A comfortable and safe working position will affect better work productivity. On the other hand, work that forces workers to be in non-ergonomic work postures causes workers to experience fatigue more quickly and indirectly provides additional workload. The correct work

positions can significantly reduce the workload and fatigue or other health problems related to work postures.

Moreover, it also provides comfort to the workers, especially those who have monotonous jobs and last a long time. Suppose the application of ergonomics postures cannot be fulfilled. It will cause discomfort or the emergence of pain on specific body parts. One of the health impacts that arise from non-ergonomic work postures is musculoskeletal disorders (MSDs).

In 2005, health problems in Indonesia showed that the work position causes around 40.5% of the illnesses suffered by workers. According to a study conducted on 9,482 workers in 12 districts or cities in Indonesia, generally, they have musculoskeletal disorders (16%). As reported by NIOSH in 1981, that 16% includes manual handling injuries and back injuries/pain caused mainly by lifting and carrying. Meanwhile, the rest are noted as Cardiovascular (8%), nervous disorders (6%), respiratory disorders (3%), and ENT disorders (1.5%) (Ministry of Health RI 2005 in Nurhayuning & Paskarini, 2015).

Based on a preliminary study conducted on February 19th, 2017, at Mitra Medika Hospital in Bondowoso, mostly medical record officers experience pain in their waist, back, neck, and shoulders. This pain is caused by storing and returning the files in the filing room. While the officers do the storing and returning process, the muscle bundles in their neck and waist experience tension. This condition occurs because the file storage or filing racks have different heights from most medical record officers' postures. It is about 205 cm in height and 300 cm in length. Indeed, this size is too large compared to the posture of a medical record officer who has a height of 150 cm. Ideally, the size of the infrastructure must be adjusted to the body of the officers. Suppose the height of the infrastructure is not following the officer's height. It will result in soreness in the back and neck area. Likewise, based on a preliminary study, the inpatient registration officers and Healthcare and Social Security Agency (BPJS) controllers also experience aches in their neck and back areas due to static work postures and how long they deal with monitors.

Mitra Medika Hospital is a class D private hospital located in Bondowoso. In this institution, medical records are vital, and of course, they must be supported by adequate and qualified facilities and infrastructure. However, the medical record units at Mitra Medika Hospital have not been supported by ergonomic facilities and infrastructure. This condition is proven by the inpatient filing racks and the medical record unit workspace, which have unbalanced height levels with the officers' postures. According to the observation's results by interviewing medical record officers, 5 out of 6 medical record officers complain of pain in their back and neck area, commonly called musculoskeletal disorders. It is evident when they are working in front of a monitor with static positions without any muscle movement.

Based on the statements above, the author focuses on research on Musculoskeletal Disorders experienced by inpatient medical record officers based on the QEC method with a thesis entitled "The Analysis of Musculoskeletal Disorders Risk Level in The Inpatient Medical Record Unit at Mitra Medika Hospital in Bondowoso Using the QEC Method".

2 Methodology.

2.1 Data Collection Method

The data collection techniques used in this study were observation guidelines, interviews, and documentation of the subject and object of research.

2.2 Data Analysis Method

The data processing and analysis used in this study was qualitative analysis. It was done by describing research results on the incidence of musculoskeletal disorders in inpatient medical record officers using interviews, observation and documentation.

2.3 Quick Exposure Checklist (QEC)

Quick Exposure Checklist (QEC) is used to determine the risk of injury to the musculoskeletal system, which focuses on the upper body back, neck, shoulder, and wrist. The advantage of the Quick Exposure Checklist (QEC) is that it considers the conditions experienced by workers from two perspectives, namely from the perspective of observers and operators. This can minimize the bias of the observer's judgment and can be applied to both static and dynamic work.

The purpose of using the Quick Exposure Checklist (QEC) is as follows:

1. Assess changes in exposure to the body that are at risk for musculoskeletal events before and after ergonomics interventions.

2. Involve observers as well as workers in conducting assessments and identifying possibilities for changes to the work system

3. Comparing the risk of injury exposure between two or more people doing the same job or between people doing different jobs.

4. Increase awareness among managers, engineers, designers, occupational safety and health (K3) practitioners and operators regarding musculoskeletal risk factors at work stations.

QEC Score (E)	Level Action	Action
≤40/%	Level 1	Acceptable
41-50%	Level 2	Investigate Further
51-70%	Level 3	Investigate Further and Change Soon
>70%	Level 4	Investigate and Chage Immediately

Information :

The level of exposure (E) is obtained by dividing the total score by the maximum score. Like the formula below:

X = Total score obtained for exposure to risk of injury for the back, shoulders/arms, wrists and neck obtained from the calculation of the questionnaire.

Xmax = Maximum total score for possible exposures for back, shoulders/arms, wrists, and neck. (In accordance with predetermined standards, where for manual handling activities Xmax = 176, for activities other than that or static Xmax = 162)

2.4 Samples and Procedures

The subjects of this study consisted of 3 registration officers, 2 officers controlling inpatient BPJS files, and 1 medical record file management officer. The subjects selection technique used is the non random sampling. This research is a qualitative descriptive study using an observational approach. limitations in this study, namely the number of respondents used in small numbers and limited geographic coverage so that the results cannot be used in general in other research findings. Data collection was carried out by observation, interviews, and documentation. The method used is the Quick Exposure Checklist (QEC) to assess the risk exposure of musculoskeletal disorders associated with work performed by respondents quickly. The officers filled out the QEC questionnaire that had been made by the researcher and after obtaining the questionnaire, the data obtained was used to calculate the exposure score and finally the researcher determined the consideration of action.

3 Result

3. 1 Working Hours

Based on the observation's results, the medical record officers' working hours are divided into two shifts per day, morning and afternoon. The Healthcare and Social Security Agency (BPJS) controlling officers start their morning shift from 7 a.m. to 2 p.m. and the afternoon shift from 2 p.m. - 10 p.m. Meanwhile, other hospital staffs start their morning shift from 7 a.m. to 2 p.m. Further, for the afternoon shift starting from 2 p.m.; to 9 p.m.

Mitra Medika Hospital in Bondowoso opens its health services in the morning, starting from Monday to Saturday. The working hours at Mitra Medika Hospital vary depending on each unit; it can be seen from table 4.1. It is explained that two respondents fall into the abnormal category of working hours, and the rest are in the normal category. Moreover, medical record officers carry out their work in static or immobile conditions.

According to the Manpower Office, the working hours are regulated in Law No. 13 of 2003, stating that the applicable working hours are 7 hours/day. Suppose the workers get six working days in a week. It will be calculated 40 hours per week. According to Article 77 paragraph 2 in Law No. 13 of 2003, it is stated that the cumulative working hours of each shift are not allowed more than 40 hours during the week. However, applying regular working hours does not mean that medical record officers can avoid the risk of musculoskeletal disorders. Factually, the static position can also cause musculoskeletal disorders. Based on the research results, only one medical record officer is in charge of managing medical record files, and the job is done with a static position. It means that the officer has a large workload, indeed.

It can be found that (Bernard et al, 1997) in Aprilia (2009) stated that there are 33 studies conducted in several industries to find the relationship between static posture and the incidence of musculoskeletal disorders of the neck and shoulders. Moreover, 27 out of 33 studies state that static posture has a significant relationship with neck/shoulder musculoskeletal disorders.

The interview results found that five of the six medical records respondents complained of frequent neck and backaches. However, there was one respondent who did not complain of neck and backaches. So, it can be concluded that working hours affect musculoskeletal disorders.

3.2 Years of Service

Among the six respondents in this study, the workers have the most extended working period of almost six years, and the shortest one is three months. Therefore, each of them is listed from the longest to the shortest into six years, five years, three years, three years, one year and three months. Indeed, the one who has a more extended working period has a more significant risk of experiencing musculoskeletal disorders. However, it does not mean that those who have the shortest working period

are not at risk of experiencing this illness. Even though they have the shortest working period, if the workers do their work with strange and static postures with a load that exceeds their ability accompanied by repetitive movements, the workers will likely experience musculoskeletal disorders. It was proven when conducting direct interviews with officers with a 5-month working period. The officer stated that he often complained of back and neck pain due to the static posture in front of the computer for 7 hours/day.

This statement is aligned with Nurliah's (2012) research, which has done a study of 60 forklift operators experiencing MSDs. On her observation, she divided the workers into two classifications. It was one with <1.7 years of service and the other with ≥1.7 years of service. Operators with <1.7 years of service have a chance of 73.3% experiencing MSDs. Meanwhile, operators with ≥1.7 years of service are noted 100% in experiencing MSDs.

Based on the research conducted by Nurliah (2012), it can be concluded that tenure has a very close relationship with the risk of musculoskeletal disorders. It can happen because the longer the officer works with awkward postures and many workloads, of course, it will result in or hurt the body, such as muscle disorders or commonly called musculoskeletal disorders. On the contrary, the working period which tends to be shorter, does not mean being unaffected by muscle disorders. In this case, muscle disorders can occur once the officer's posture is static or does not move much, and there are repetitive movements at the same time. Based on the interviews conducted, five out of six respondents complained of back pain, and one with three months of service did not complain of aches. Therefore, it illustrates that years of service is closely related to the risk of musculoskeletal disorders.

3.3 The Age

The inpatient medical record unit has six workers of different ages. The oldest worker is 47 years old, and the youngest is 23 years old. The ages of each worker from the oldest to the youngest are 47-year-old, 33-year-old, 26-year-old, 25-year-old, 23-year-old, and 23-year-old. The older the workers are, the more their muscle ability will decrease. It is what makes medical record officers experiencing pain in the back and neck area. The interview results also supported this condition, stating that most medical record officers complained of back and neck pain. This study is in line with research conducted by Collins and O'Sullivan (2009) in Zulfiqor (2010) which studied 200 women and 132 men with different types of work in Ireland, and the age range was between 18-66 years. The soreness on their back, shoulders and neck are more experienced by the young workers than the older workers. In addition, the number of MSDs complaints that occur at the age of 18-30 years is due to a decrease in body dimensions which affects biological changes, tightening the disc in the spine and thinning the cartilage pads that affect the muscle strength in the body (Aprilia, 2009).

Petter (2000) also states that someone usually experiences muscle complaints at the age of 24-65. Generally, the first complaint is experienced at the age of 30, and the complaints will increase with age. At the age of 30, there is degeneration in tissue damage, tissue replacement into scar tissue, and reduced fluid reduction. All of those issues can cause a decrease in the stability of bones and muscles.

So it is clear that the age category is very closely related to muscle strength in each individual. The older a person is, the muscle and bone abilities will weaken and, of course, not as strong as 20-year-old men. It should be underlined that 24-65 years of age should not do excessive activities, such as lifting weights > 5 kg. Furthermore, they have to do muscle stretching every 1-hour so that the muscles forced to work can be more relaxed and avoid musculoskeletal disorders.

3.4 Nutritional Status

Medical record officers have a body mass index that varies from one to another. For example, four people have a normal BMI (Body Mass Index) category among six inpatient medical record officers. Following the BMI results obtained from measuring the height and weight of the workers, the first officer has a BMI of 24.2 with a height of 163 cm and a weight of 63kg considered to be the standard category. The second officer has a typical BMI of 23.7, with the officer's height being 165 cm and weight 64 kg. The third officer has a BMI of 23.2, with 158 cm height and 58 kg weight, also in the normal category. Then, the fourth officer also has a typical BMI of 23.0 with a height of 153 cm and a weight of 53 kg.

Meanwhile, the remaining two medical record officers are in the thin category. For example, the next officer has a thin BMI of 18.5 with a height of 150 cm and a weight of 41 kg. Further, the last officer also falls into the thin category by gaining a BMI of 17.5 with a height of 155 cm and 42 kg weight.

The Body Mass Index or its magnitude is a nutritional status closely related to muscles or bones. It is supported by Wemer's theory (1994) in Tarwaka (2004), which states that someone who is obese (obese with body mass> 29 kg) has a risk of 2, 5 higher than the lean (body mass <20 kg), especially for leg muscles. Whether or not a person is fat affects the level of musculoskeletal complaints. It is supported by Yulvi's (2016) research, which explains that for someone who is obese, 11.8% has mild complaints, and the rest has severe complaints of having Musculoskeletal Disorders. In addition, someone who is not obese (standard) has 79, 4% mild complaints and the rest have severe complaints.

So, it can be concluded that nutritional status can affect a person's risk level of musculoskeletal disorders. This statement is supported by Tarwaka's research which states that someone who is obese (obese with body mass > 29 kg) has a 2.5 higher risk than those who are thin (body mass <20 kg). The fatter a person is, the heavier the work of muscles and bones to support the body.

3.5 Smoking Habit

The inpatient medical record officers have certain habits, one of which is smoking. Two males out of six officers have a smoking habit. The first officer is a male of the age of 33 years old. He can spend one pack of cigarettes in a day, in which one pack contains 12 pieces of cigarettes. Then, the second officer is a 47-year-old male who can spend two packs of cigarettes in one day, which means that the second officer can spend 24 cigarettes per day.

Based on the interview results that have been shown above, the first officer is considered a moderate smoker. It is called a moderate smoker if someone can smoke up to 10-20 cigarettes per day, then the second officer is in the heavy smoker category because he smokes > 20 cigarettes per day (Bustan, 2010).

This issue is supported by observations made by Deyo and Bass (1989). They observed that the prevalence of back pain increased with the increasing number of packs of cigarettes and with the level of heavy smoking. Furthermore, workers who have a smoking habit are at a 2.84 times higher risk of experiencing musculoskeletal complaints than workers who do not have a smoking habit (Winda, 2012 in Fuady, 2013).

So with the explanation of the research above, it can be concluded that the existence of smoking habits in each individual can affect the prevalence of back pain, especially in someone who is categorized as a heavy smoker. It can be concluded that smoking is closely related to a person's risk of developing musculoskeletal disorders.

3.6 Measuring the Employment Factors Using QEC Method

In receiving inpatients, three processes have to be fulfilled, namely the computer-based patient registration process, manual patient registration, and last is taking insurance files. There are three respondents in this registration unit. Among the three activities above, all respondents are included in level 3, requiring treatment shortly. However, the third respondent who handles the insurance files process is included in level 2, which means the treatment is needed in near future.

According to Agus Hadian Rahim, DR.dr.SpOT, Mhum and Kusmedi Priharto SpOT.MKes.FICS, the treatments are taken for someone with the musculoskeletal disorders. And it can be done through regular stretching exercises involving pressure to stretch the muscles for 20 to 45 seconds in one to two times a day. The stretching method can be done even when the respondent is in the workspace to do it quickly and does not need a specific place to stretch. Moreover, Agus Hadian Rahim DR.dr.SpOT.Mhum and Kusmedu Priharto SpOT.MKes.FICS also suggested doing regular exercise for 30 minutes to train muscle strength so that it is not easy to get musculoskeletal disorders.

In another case, there is only one respondent to be placed in the medical record files management unit. Some activities in managing medical record files include assembling, coding, indexing, and filling. This respondent is in level 3, which means that a treatment is needed shortly. According to Agus Hadian Rahim DR.dr.SpOT.Mhum and Kusmedi Priharto SpOT.Mkes.FICS, the treatments are taken for someone affected by musculoskeletal disorders. It can be done through regular stretching exercises involving pressure to stretch the muscles for 30 to 45 seconds, in one to two times a day. Stretching can be done once the respondent is in the workspace to do it quickly and does not need a specific place to stretch. Then Agus Hadian Rahim DR.dr.SpOT.Mhum and Kusmedi Priharto SpOT.Mkes.FICS also suggested doing regular exercise for 30 minutes to train muscle strength so that it is not easy to get musculoskeletal disorders.

In the BPJS files controlling unit, there is one activity, namely inputting data into the computer, and there are two respondents in this unit. Based on the results of the QEC calculation, the two respondents are in the 3 level, which requires treatment shortly.

According to Agus Hadian Rahim, DR.dr.SpOT.Mhun and Kusmedi Priharto SpOT.MKes.FICD, the treatments are taken for someone affected by musculoskeletal pain. It can be done through doing regular stretching exercises involving pressure to stretch the muscles for 30 to 45 seconds, in one to two times a day. Stretching can be done whenever the respondent can do it and does not need a specific place to stretch. Then Agus Hadian Rahim DR.dr.SpOT.Mhum and Kusmedi Priharto SpOT.Mkes.FICS also suggested doing regular exercise for 30 minutes to train muscle strength so that it is not easy to get musculoskeletal disorders.

3.7 The Overview of Medical Record Unit Facilities

a. Imperfect Safety Device

Safety equipment is personal protective equipment or commonly called PPE. PPE is a tool that can protect someone's part of the body or the whole body from potential hazards in the workplace. Based on the research results conducted on six respondents in each unit, there were three respondents in the patient registration unit. Two out of three respondents complained that they had been scratched by a glass table located in the registration unit, causing lethargy which was not too severe.

To protect the officers from hazards or work accidents, the facilities and infrastructure at the registration unit, like the glass table, must be given rubber edges to avoid the officers experiencing any work accident when carrying out their activities. In another case, there is only one respondent on duty in the medical record management unit. According to the research results, the respondent said she ever had a sprain when placing loads of medical record files. As the filing rack is higher than the

respondent's posture and there are no facilities to assist in transporting medical record files such as trolleys, the officer has to lift loads repeatedly to put them on the existing filing rack.

In the medical record management unit, especially in filing activities, tools such as trolleys should be provided to make it easier for the officer to transport medical record files. Furthermore, the filing rack should be following the posture of the officer. So it is necessary to redesign the height and width of the filing rack. Next, move on to another unit, and the last one is the inpatient BPJS files controlling unit. There are two respondents in this unit. Based on the observation result, respondents said they had never had a work accident. Therefore, the infrastructure in the controlling unit was primarily safe for the officers to do their jobs.

b. Broken Equipment

Good maintenance of every infrastructure is beneficial and needed so that it will not endanger individuals. Identifying the research result from each unit at Mitra Medika Hospital in Bondowoso, no facilities were damaged or possible to endanger the respondents. However, it was just that the equipment was not up to standard. For example, there was no safety device on the glass table in the registration unit. Each respondent also stated that maintenance on the storage room or filing rack is carried out every three months by rearranging files to make them look neat and more accessible to find files.

Improvements to facilities and infrastructure in the hospital should be carried out regularly because it will help the officers' performance. For example, it could be done by repairing the glass tables in the registration unit first. By giving it a rubber-like edge to avoid any work accidents experienced by the officers. In this way, the equipment can be declared safe to be used.

c. Hazardous Procedures (SOPs)

Standard operating procedures applied at Medika Bondowoso Hospital have been well implemented since then, starting from patient admission to medical record file management. However, in the BPJS files controlling unit, the SOP has not been applied because it is new for Mitra Medika Hospital to handle BPJS patients' admission. According to the interview results, the respondents said that it took time to create a new SOP, so that they had not made it until now.

Following the interviews above, it is necessary to immediately make standard operating procedures in the BPJS files controlling unit, so that every activity can run well. Further, it will help to improve the efficiency and effectiveness of implementing the individual duties and responsibilities of employees as well as the organization as a whole.

d. Unsafe Storage Equipment

The medical record unit has a storage area called a filing rack, the shelf that is utilized for storing the patient files (medical record files). The observation found that some parts in the storage room at Mitra Medika Hospital are considered unsafe. For example, the shelf base is made of plywood or other uneven wood. Indeed, there is a risk of being scratched by this kind of rack's base. Moreover, the height of the filing rack that exceeds the officer's posture can also cause some accidents for the officers. As the study has found, the height of the filing rack is 205 cm, while the officer's height who works in the scope of the filing rack is 150 cm. Indeed, it is difficult for the officers to reach the top of the shelf and can even cause sprains if they are forced to reach it out. At any worse, loads of medical record files will easily fall on the officers working under it. Further, respondent 4 said that the filing room lacked light. Therefore, it makes the officers often take the wrong files at night.

Based on the findings above, it is necessary to redesign the filing rack so that the height and anthropometry of the officers are appropriate. Besides, it also helps to reduce the risk of work accidents such as sprains and back pain that can occur at any time if the officer often lifts heavy loads. Next, adding more lighting will be the best solution for the filing room and create more ventilation too so that the filing room gets a healthy air circulation. By adding some lights, the officers have no trouble finding files at night anymore. Further, the addition of ventilation can keep the medical record files from moldy.

3.8 The Overview of Musculoskeletal Disorders Risk Level in Medical Record Officers

a. The Medical Record Officers of Patient Registration Unit

There are three respondents in the patient registration unit. This study points out three parameters:

- individual factors
- facilities and infrastructure factors, which support the results of calculations using the QEC method
- work factors that are useful for calculating the QEC method

Based on the results of observations and interviews conducted with the three respondents, it was found that the variable working hours for the registration officers had met the standards applied by Law No. 13 of 2003, namely 7 hours/day. Then, for the age variable of the three respondents, it was included in the category of vulnerable to musculoskeletal disorders. Next, for the smoking habit variable, two respondents fall into the category of moderate smokers. Deyo and Bass (1989) stated in their study that the prevalence of back pain would increase along with the increase in the number of packs of cigarettes. Therefore, it proves that both respondents have a risk of developing musculoskeletal disorders. The following supporting factor is the existing facilities and infrastructure in the registration unit. Based on observations made by researchers that the distance between the keyboard and the officer's body is too far, making it difficult for them to input the patient data into the system. In this case, the officers tend to be uncomfortable with such a position. This posture can put the officers at risk of musculoskeletal disorders.

It is strengthened by the results obtained using the QEC method, proving that the three respondents have a risk of musculoskeletal disorders up to the level 3. However, the third respondent, who has done the taking insurance files activity, is included in the first level. Following the case, further treatments will be needed for respondent who will enter the second level for some time ahead.

b. The Medical Record Officer of the Medical Record File Management Unit

There is one respondent in this medical record file management unit. In analyzing the case, this study referred to three parameters, namely individual factors; facilities and infrastructure factors, to support calculations using the QEC method; and work factors that are useful for calculating the QEC method. Based on the observations and interviews conducted on the officer, the results obtained on the variable of working hours for the medical record file management officer have met the standards applied by Law No. 13 of 2003, namely 7 hours/day. Meanwhile, the age variable of the respondent is included in the category not prone to the risk of musculoskeletal disorders. Next, the respondent's smoking habit variable showed that this officer is included in the non-smoking category.

The following supporting factor is the existing facilities and infrastructure in the medical record file management unit. Based on observations made by researchers, it is found that the distance between the keyboard and the officer's body is too far, making it difficult for the officer when entering patient data into excel. Further, the work chair provided by the hospital does not have foam pads on its back

and seat. This condition made the officer feel sore in the back and neck area while doing the job. At any rate, it can increase the risk of musculoskeletal disorders in the officer.

Moreover, the filing rack does not match the respondent's body, in which the height of the rack reaches 205 cm, and the officer's height is only 150 cm. Indeed, it can put the officer at risk of musculoskeletal disorders. It is also supported by the absence of a trolley that can help the respondent work efficiently in transporting the files or some ladders to help the officer put files in the filling rack. Based on the results of calculations using the QEC method, the respondent falls into the third level category due to doing assembling coding, indexing and filling activities. In this case, the respondent is positively experiencing musculoskeletal disorders and the treatment is needed shortly.

It is also supported by the results of interviews which stated that the respondent often complains of aches in the back and neck area that is caused by carrying out the activities in a static posture or did not do any movement. So, with a description of several factors above, the respondent is proven to have musculoskeletal disorders.

c. The Medical Record Officers of Inpatient BPJS Files Controlling Unit

There are two respondents in the inpatient BPJS files controlling unit. In identifying the case, this study pointed out three parameters: individual factors; facilities and infrastructure factors, to support calculations using the QEC method; and work factors that are helpful in calculating the QEC method.

Based on the observation and interview results, it was found that the working hour's variable for inpatient BPJS files controlling officers did not meet the standards applied by Law No. 13 of 2003, namely 7 hours/day. In which the officers worked up to 8 hours/day. Next, for the age variable of the respondents, it is found that the fifth respondent is considered in the category of susceptible to the risk of musculoskeletal disorders. Meanwhile, the fourth respondent is in the category not susceptible to the risk of musculoskeletal disorders. Further, the two respondents are included in the category of not smoking for the smoking habit variable.

The subsequent supporting factor is the existing facilities and infrastructure in the inpatient BPJS files controlling unit. Based on observations made by researchers, it is found that the distance between the keyboard and the officers' body is too far, making it difficult for officers to enter patient data into the system. Furthermore, it frequently makes them feel sore in their back if they are forced to work for a long time. In addition, the respondents did the job in a static position or did not do any movement. In this case, the static position dramatically affects the risk of musculoskeletal disorders. It is stated by Bukhori (2010) that static posture occurs when the joints do not move. This condition not only limits the intake of nutrients and oxygen but also waste of metabolism, thereby increasing the load on muscles and tendons, and causing fatigue.

Based on the results of calculations using the QEC method, respondents fall into the third level where the treatment is needed shortly. It means that respondents experience musculoskeletal disorders. It is also strengthen by the results of interviews, which stated that respondents often complain of aches in the back and neck area due to carrying out their activities in a static posture. Further, following the findings based on several factors, respondents are proven to have musculoskeletal disorders..

Conclusion and Recommendations

Through the individual factors related to the working hours' variable, two respondents fall into the abnormal category as their working hours are not following the Law No. 13 of 2003, which explains that regular working hours are 7 hours/day with six working days per week. Moreover, the years of

service variable shows that the most extended working period is six years, and the shortest is five months. Next, on the age variable, the youngest age is 23 years old, and the oldest is 47-year-old. Meanwhile, regarding the nutritional status of medical record officers, two out of six respondents fall into the thin category with BMI of 18.5 and 17.5. On the other hand, the smoking habit variable shows that two respondents have a smoking habit and fall into moderate smokers and heavy smokers.

The occupational factors related to the QEC method, based on the assessment by the QEC method, it was found that the work postures of the six respondents were in an awkward posture with a bent position. In addition, the position of the shoulders/arms was almost entirely around the chest with frequent movements, coupled with an almost straight wrist position or sometimes flexed and a lowered neck position.

The research results on the existing facilities and infrastructure in the medical record unit showed that respondents complained about the registration desk that was not covered with rubber on the edges, that it was possible to scratch the officers during the working hours. Further, the respondents also complained about the filing rack, which was not following the respondent's anthropometry. It was causing the respondent to have had a work accident such as a sprain when returning the medical record file on the filing rack.

Based on measurements processes by using the QEC method on all medical record working units, such as patient registration, medical record file management, and inpatient BPJS files controlling units, the value is in level 3. Therefore, it means the treatment is needed in the present time. Besides, the third respondent handling the insurance file collection process has a value of level 2, which means that the treatment is needed in near future.

For the director of Mitra Medika Hospital in Bondowoso, it is better to provide the facilities needed in each process, such as chairs with cushions, arm pads, and good backseat that are following the posture of the medical record officers. Besides, providing a comfortable and safe desk is needed for better work experiences. Then, the hospital needs to add some human resources to the medical record file management unit so that officers can do their work quickly and lightly. Moreover, the workload of each worker can slightly be reduced.

On the other hand, medical record officers should do muscle stretching for 30 to 45 seconds, one to two times a day. It is essential to avoid a static posture. For the director of Mitra Medika Hospital, it is advisable to replace the filing rack or redesign the filing room. It can be started by adding lights so that the file retrieval process can be done quickly. In addition, it is vital to replace the filling rack with one that is following the officer's posture. Alternatively, add some equipment that helps the officers to work effectively in the filing process. It can be a trolley to transport files and a ladder to help put medical record files on the top of the shelf. It aims to reduce the risk of musculoskeletal disorders to the workers. Then, it is needed to provide an additional shelf for insurance files in the registration unit. After that, changing the spot of this storage is preferable, which was initially on the back of the medical record officer. It is better to put it in front of the officer. That way, the officers do not have to turn their bodies to take the file. The costs required to reduce the risk of musculoskeletal disorders in medical record workers vary from those that require large costs and resources such as redesigning the filing room and those that require relatively small costs such as adding additional facilities and infrastructure such as chair cushions, armrests and ladders. This solution can be done by compiling a budget for medical record infrastructure needs so that it can be determined which facilities can be realized quickly

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