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Article

Multivariate Analysis on The Determinants of Work Fatigue Factors for Nurses Inpatient Care at RSUD Arifin Achmad Hospital Pekanbaru

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Abstract. Work fatigue is one of the few symptoms that is often found in a hospital or hospital. Based on data almost every year as many as 2 million workers die due to accidents caused by fatigue. This research aims to analyze the relationship of age, sex, years of work, nutritional status and work shifts to work fatigue. This research is a quantitative observational analytic study with an analytic cross-sectional study design and a sample size of 60 people. Primary data were collected by direct observation, interviews with the KAUPK2 questionnaire and measurement of Lassidaya L77. The results of bivariate analysis showed a relationship between age and nurse work fatigue (p = 0.026). There was no gender relationship (p = 0.552), years of service (p = 0.104), nutritional status (p = 0.288) and work shift (p = 0.132) with work fatigue. Arifin Achmad Hospital (p = 0.009) POR 12,199 (95%: 1,847 - 80,575). Counfonding work shifts with tenure. There is no relationship between sex and nutritional status with the incidence of work fatigue. Nutritional status (p = 0.571), POR 1.458 (95%: 0.395 - 5.379). Nutritional status (p = 0.866) 1.062 POR (95%: 0.527 - 2.140). The age variable was not included in the multivariate analysis because it was homogeneous. From the results of the analysis it was concluded that the working period ≥ 10 years affects work fatigue compared to ten years <10 years.

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1. Introduction

Work fatigue is one of the occupational health and safety issues that can be a risk factor for accidents at work. According to the Ministry of Manpower and Transmigration in based on data on work accidents recorded in Indonesia every day an average of 414 occupational accidents is 22.7% due to fatigue that is quite high. Where the determinants of work fatigue vary from factors of work environment that are inadequate to work (noise, lighting and temperature), rest periods and disproportionate working hours can increase the degree of work discharge, the health of workers who are not monitored properly, giving Inadequate nutrition can result in work fatigue, workload on workers should be adjusted to the physical and psychological abilities of workers, travel time to and from work, mental development that takes place periodically and work shifts[1-9].

Data from the International Labor Organization (ILO) 2003 shows that almost every year as many as two million workers die due to work accidents caused by fatigue. The feeling of sluggishness is one of several symptoms that are often found in clinics and hospitals. In a survey in the USA this fatigue is a big problem, 24% of all adults who come to the clinic suffer from chronic fatigue. Almost the same data can also be seen in a community survey in the UK which states that 25% of women and 20% of men complain that they always feel tired. Even though work fatigue is complained almost every day by workers in each work unit, but until 1990 work fatigue is still a mystery of the modern medical world which is full of obscurity in its causes[1-17].

Regional General Hospital (RSUD) Arifin Achmad Riau Province is a Class B education hospital, is a Riau provincial government institution that has duties and functions including individual health care efforts, a referral center of district and city hospitals in Riau Province. Arifin Achmad Regional Hospital of Riau Province has six service facility categories, namely, outpatient facilities, inpatient installation facilities, emergency treatment facilities, supporting facilities, diagnostic and therapeutic support facilities as well as superior facilities[10-17].

At Arifin Achmad Hospital, Riau Province, there are approximately 579 in-bed beds, with a total of 445 inpatient nurses including the coordinator and the room team leader. Where is the bed in Arifin Achmad Hospital Riau Province every day almost completely filled by patients, with the number of inpatients 29,952 people per year. Nurses in inpatient care have an important role in carrying out care for patients. With a high number of inpatients, nurses at the inpatient installation also have jobs with a high level of busyness, which has an impact on work fatigue for nurses. Based on the description above, researchers are interested in conducting research on the analysis of Nurse's Fatigue Determinant Factors in Inpatient Installation of Arifin Achmad Regional Hospital, Riau Province in 2017.

2. Experimental Section

This research is quantitative analytic observational, where the process to determine and interpret existing data or factors related to events. This type of analytic cross-sectional cross-sectional study design in which the independent variables and dependent variables are expressed at the same time to respondents who aim to find out certain factors and problems. Respondents in this study were nurses inpatient installation Arifin Achmad Regional Hospital of Riau Province, amounting to 431 people[18-22].

According to Isgiyanto (2009), determining the sample size if the population (N) is known, namely:

$$n = \frac{NZ^2_{1-\propto/2}\, P(1-P)}{N\, d^2 + Z^2_{1-\propto/2}\, P(1-P)}$$

$$n = \frac{431\ (1{,}96)^{\ 2}\ x\ 0{,}8\ (1-0{,}8)}{431\ (0{,}1)^{\ 2} + (1{,}96)^{\ 2}\ x\ 0{,}8\ (1-0{,}8)}$$

$$n = 53{,}84 \approx 54$$

n = large sample
N = large population of 431 respondents
$Z_{1-\propto/2}$ = standard normal distribution, which depends on α , confidence interval (1- α) = 95%, then α = 5%, so that $Z_{1-\propto/2} = 1{,}96$
P = the proportion of events is 80% = 0,8
d = the magnitude of the deviation (absolute) received is 0.1

Based on the sample size calculation, the number of samples obtained was 54 respondents and rounded to 60 respondents (Ariawan, 1998).

Table 1. Operational Definition of Dependent Variables in Work Fatigue Research

No.	Variable	Operational Defenition	Scale	Category
1	Work Fatigue	Complaints of fatigue due to work felt by respondents based on subjective symptoms as measured by KAUPK2 I, II, III. The question consists of 17 questions with 6 alternative answer choices worth 1-6, if the total value is: - 18-34 tired -> 35 are very tired	Nominal	0 = light 1 = weight
		Feelings of fatigue are measured objectively using the Lakassidaya L77 reaction time by slowing down the respondent's time to respond to light and sound stimulation in milliseconds, if the total value is: - <410 tired - ≥ 410 are very tired	Nominal	0 = light 1 = weight

Table 2. Operational Definitions of Independent Variables in Work Fatigue Research

No	Variable	Operational Definition	Scale	Category
1	Age	The length of time the respondent lived from birth until this study was conducted which was calculated from the respondent's birthday using a unit of year	Nominal	0= < 40 thn 1= ≥ 40 thn
2	Sex	Identified physical marks on respondents who were born from birth	Nominal	0 = Male 1=Female
3	Years of Service	The length of time the respondent underwent the nursing profession in the inpatient installation of Arifin Achmad Hospital	Nominal	0 = <10 years 1 = ≥10 years
4	Nutrition	The nutritional state of the respondent at the time of Body Mass Index measurement with the formula weight divided by height squared (meters) 0 = normal 18.5-24.9 1 = malnutrition if <18.5 2 = over nutrition ≥ 25.0	Ordinal	0 = Normal 1 = Less 2 = More nutrition
5	Shift	The work time taken by the respondent is in accordance with the division of work schedules 0 = morning shift 07.30-14.00 am 1 = afternoon shift 14: 00-21: 00 am 2 = night shift 21: 00-07.30 am	Ordinal	0 = Morning 1 = Afternoon 2 = Night

The type of data collected for this research are primary data and secondary data. Primary data are independent variables (age, gender, years of service, nutritional status, and work shifts) collected using a questionnaire containing closed questions through structured interviews and filling in KAUPK2 where respondents answered 17 questions with 6 alternative answers, each worth 1 (never), 2 (rarely), 3 (rarely), 4 (yes, quite often), 5 (yes, often) and 6 (yes, very often).

Measurement of feelings of fatigue is also assisted by using the Lakassidaya L77 Reaction Timer tool which is carried out after the nurse has finished her work on that day.

Secondary data is data of nurses in the Inpatient Installation of Arifin Achmad Hospital in Riau Province which is obtained by requesting data from the Arifin Achmad Regional Hospital in Riau Province. Ways of collecting data and instruments used for primary and secondary data collection are shown in the following table:

Table 3. Data collection in the Determinant Research Factors of Work Fatigue Nurse Inpatient Installation Arifin Achmad Hospital Riau Province in 2017

Data Type	Variable	How to get data	Instrument
Primary data	Fatigue	Fill Quetioner *Reaction Timer*	- KAUPK2 - Lakassidaya L77
	Age	Fill Quetioner	Quetioner
	Sex	Fill Quetioner	Quetioner
	Years of Service	Fill Quetioner	Quetioner
	Nutritional Status	Pengukuran IMT	Quetioner
	Works Shift	Fill Quetioner	Quetioner
Secondary Data	Nurse data at Arifin Achmad Regional Hospital in Riau Province	Requesting the Arifin Achmad Regional Hospital of Riau Province	-

After the data is collected, then computerized data processing is carried out through a process with the following stages; Editing is done by checking the completeness of the answers to the questionnaire filled out by the respondent with the aim that the incoming data can be processed correctly so that the data processing is grouped using the regulatory aspects. At this stage is the activity of checking the validity of incoming data. The checks carried out in this study were by filling in KAUPK2 and checking the reaction time using Lakassidaya L77.

Coding provides code in each category for each variable in the order of the respondent's number, with the intention of making it easier for researchers to process data. For age, sex, work period, nutritional status, work shift variables were conducted using interviews using the KAUPK2 questionnaire, while fatigue used reaction time measurements with Lakassidaya L77.

Processing, is an activity to process data so that it can be analyzed. The researcher enters data from the questionnaire filling into the master table or computer database and performs univariate analysis, bivariate analysis and multivariate analysis.

Cleaning, is an activity of checking back data that has been entered, whether there is an error or not. At this stage the researcher is assisted by fellow students.

Tabulating, is the stage of organizing data activities in such a way so that it can easily be numbered, organized, and arranged to be presented and analyzed. At this stage the researchers were assisted by colleagues from Epidiomology Masters

Multivariate analysis in this study was used to see the independent variables (age, sex, years of service, nutritional status, and work shifts) that were most dominantly related to the dependent variable (work fatigue), calculating the magnitude of risk with the Prevalence Odds Ratio (POR) rate and eliminate the influence of the troublemaker variable. Multivariate analysis conducted was multiple logistic regression, following two stages, bivariate selection and multivariate modeling. In multivariate modeling explained the examination of confounding or confounding variables and interactions between certain variables. If the independent variables with two categories were performed multivariate logistic regression analysis without dummy. If there are more variables with two categories, the multivariate test must be preceded by doing a dummy on the variable. In this

study before multivariate analysis was conducted, a dummy was performed on variables consisting of categories.

3. Results and Discussion

Multivariate analysis aims to see or study the relationship of several independent variables simultaneously with one or several dependent variables. In this research, the multivariate analysis conducted was Multiple logistic regression by following 2 stages, namely: Bivariate Selection and multivariate modeling.

3.1. Bivariate Selection

Each independent variable is analyzed bivariately with the dependent variable. If the bivariate results produce p value <0.25, then the variable is entered into the multivariate stage. For independent variables whose bivariate selection results in p values> 0.25 but substantially important, these variables can be included in the multivariate model. Bivariate selection uses a simple logistic regression test, a mathematical model used to analyze the relationship of one or several independent variables with a categorical dependent variable. The results of the bivariate selection of 5 independent variables can be seen in Table 4.

Table 4. Results of bivariate selection of independent variables with work fatigue in nurses at the Arifin Achmad Regional Hospital in Riau Province in 2017

No	Independent Variable	P Value	Information
1	Age	0,007	Candidate
2	Sex	0,370	-
3	Years of Service	0,049	Candidate
4	Nutritional Status	0,269	-
5	Work Shift	0,127	Candidate

Based on the table above only 3 variables are candidates for the multivariate stage (age, years of service, shifts) but for the age variable will not be included in the multivariate stage because it is homogeneous. Meanwhile, gender and nutritional status variables will be included in the multivariate stage because they are considered as important substances.

3.2. Multivariate Modeling

Multivariate Modeling of 1

Multivariate 1 modeling is modeling by including all candidate variables.

Table 5. Multivariate Modeling Analysis 1

Independent Variable	P Value	POR	(95% Cl)
Sex	0,585	1,441	0,388 – 5,354
Years of Service	0,013	11,301	1,664 – 76,735
Nutritional Status	0,868	1,062	0,527 – 2,140
Shift	0,027		

Shift 1	0,066	4,905	0,903 – 26,650
Shift 2	0,007	12,566	1,990 – 79,348

The results of the analysis show that the nutritional status variable has the greatest p value of 0.866 so that it is excluded from multivariate modeling.

Multivariate Modeling of 2

In Table 6 shows the analysis of the relationship of work fatigue with the independent variables gender, length of work and work shifts.

Table 6. Multivariate Modeling Analysis 2

Independent Variable	P Value	POR	(95% Cl)
Sex	0,571	1,458	0,395 – 5,379
Years of Service	0,012	11,519	1,715 – 77,391
Shift	0,027		
Shift 1	0,61	4,982	0,926 – 26,813
Shift 2	0,007	12,527	1,985 – 79,053

To ascertain whether nutritional status variables are not included in the model or maintained as confounding, changes in POR values will be seen.

Table 7. Changes in POR values after multivariate analysis

Independent Variable	POR has nutritional status	POR without nutritional status	POR % change
Sex	1,441	1,458	1,1%
Years of Service	11,301	11,519	1,9%
Shift			
Shift 1	4,905	4,982	1,5%
Shift 2	12,566	12,527	0,31%

With the results of the POR comparison, no one is> 10% and thus the nutritional status variable is excluded in multivariate modeling.

Multivariate Modeling of 3

In multivariate modeling 3 gender variables (p value 0.585) were excluded from modeling.

Table 8. Multivariate Modeling Analysis 3

Independent Variable	P Value	POR	(95% Cl)
Years of Service	0,009	12,199	1,847 – 80,575
Shift	0,027		
Shift 1	0,064	4,866	0,911 – 25,996
Shift 2	0,007	12,433	1,978 – 78,130

To ascertain whether gender variables are not included in the model or maintained as confounding, changes in POR values will be seen.

Table 9. Changes in POR values after multvariate analysis

Independent Variable	POR has sex	POR without sex	POR % changes
Years of Service	11,519	12,199	5,9%
Shift			
Shift 1	4,982	4,866	2,3%
Shift 2	12,517	12,433	0,75%

After comparing the POR values, none were> 10%, thus gender variables were excluded in multivariate modeling.

Multivariate Modeling of 4

In multivariate modeling 4 work shift variables (p value 0.27) that will be excluded from modeling.

Table 10. Multivariate Modeling Analysis 4

Independent Variable	P Value	POR	(95% Cl)
Years of Service	0,63	3,857	8,927 – 16,048

To ascertain whether the work shift variable is not included in the model or maintained as confounding, a comparison of POR values will be seen.

Table 11. Changes in POR values after multivariate analysis

Independent Variable	POR has shift	POR without shift	POR % changes
Years of Service	12,199	3,857	68,4%

Based on Table 12 there is a change in POR value of more than 10%, then the work shift variable is a confounding variable and will be re-entered into multivariate modeling.

Table 12. Last Multivariate Analysis Determinants of Work Fatigue Factors of Nurses Inpatient Installation of Arifin Achmad Regional Hospital Riau Province 2017

Independent Variable	P Value	POR	(95% Cl)
Years of Service	0,009	12,199	1,847 – 80,575
Shift	0,027		
Shift 1	0,064	4,866	0,911 – 25,996
Shift 2	0,007	12,433	1,978 – 78,130

The interpretation of multivariate analysis is the dominant variable affecting the incidence of work fatigue in nurses, namely work period. Nurses who work more than ≥ 10 years at risk 3.8 times experience work fatigue compared to nurses who worked <10 years. This means nurses with ten years masa tenure have a significant relationship to the level of heavy work fatigue compared with nurses with ten years <10 years with a statistical value (p = 0.009) POR 3.857 means nurses with ten years masa tenure have a risk of severe fatigue 3.8 times compared to the nurse's tenure <10 years. There is evidence that so far nurses who work for years only perform nursing tasks to patients so that the accumulation of monotonous work that results in heavy fatigue at the nurses. In this case the work shift is confounding the working period. The absence of division of work shifts that are adjusted to the length of work can affect the high level of work fatigue for nurses who work longer. The number of nurses who are not adjusted to the needs of work at the time the work shift takes place, the absence of a substitute nurse when other nurses cannot work can also affect the work fatigue of nurses. The relationship between work period and work shift with work fatigue in nurses Arifin Achmad Hospital in Riau Province can be seen in the following figure 1.

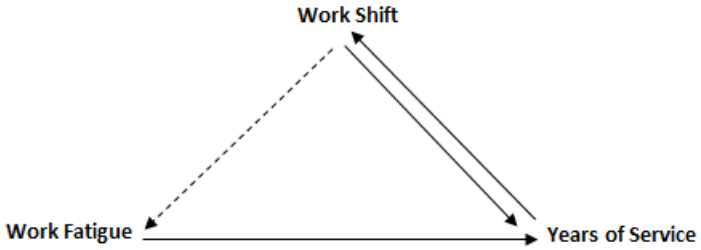

Figure 1. Relationship between work tenure and work shift with work fatigue

In the picture above it can be explained that the nurse's length of service is directly related to the nurse's work shift. While work shifts is a counfonding of work fatigue.

5. Conclusion

Based on the description of the results and discussion, the age variable is significantly related to Work Fatigue in Inpatient Installation Nurses of Arifin Achmad Regional Hospital of Riau Province in 2017 when analyzing bivariate selection, but not included in the multivariate modeling because it is homogeneous. The sex variable is not significantly related to work fatigue. Work Fatigue in Nurses in Inpatient Installation of Arifin Achmad Regional Hospital, Riau Province in 2017. Variable length of service is significantly related to Work Fatigue in Inpatient Nurses in Arifin Achmad Regional Hospital in Riau Province in 2017. Working period of more than 10 years has a risk of 3.8 times experiencing work fatigue compared to nurses who have worked less than 10 years. Nutritional status variable is not significantly related to Work Fatigue in Inpatient Nurse Installation Arifin Achmad Hospital Riau Province in 2017 Work shift variable is a counfonding variable in this study.

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