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Work and Individual Factors Influencing Stress Among Nurse Anesthetists in West Java, Indonesia

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ABSTRACT

Introduction: Anesthesia services have complex and high-risk work characteristics, which can impact work stress in health workers, including nurse anesthetists in the operating room. This research aims to determine the relationship between work and individual characteristics and the incidence of work stress experienced by nurse anesthetists.
Methods: The research method used was quantitative research with a cross-sectional approach. The population in this study were nurse anesthetists in the West Java region who were members of the DPD IPAI JABAR, totalling 765 people. The sample was chosen with non-probability sampling using a stratified random sampling technique based on the work area of the nurse anesthetists, totalling 88 people. The research instrument used a questionnaire about individual characteristics, work characteristics, and workload using the Maslach Burnout Inventory (MBI) questionnaire, created as a Google form sent via the DPD IPAI West Java admin. Data analysis uses regression with chi-square.
Results: The research results show that the average work stress is 58.15, with a minimum value of 23, a maximum of 87, and a moderate stress category of 81.8%. Work characteristics related to work stress include hospital type (p-value 0.003), length of work per day (p-value 0.016), and patient's ASA (p-value 0.013). Meanwhile, individual characteristics related to work stress are age (0.002) and year of work (0.000).
Conclusion: Differences in working hours, type of hospital, work patterns, length of service, type of hospitals, as well as lack of seminars or education regarding stress management in the workplace, can influence work stress so that there is a need for clear work mapping for the hospital so that the quality of service can be provided optimally.

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INTRODUCTION

Surgical procedures prioritize the obligation to pay attention to patient safety, patient readiness, and the procedures to be carried out because of the high risk they pose when they are not carried out following the standard operational procedures that have been established. The incidence of injuries punctured by sharp objects during surgery is proof that surgical anesthesia services have a high risk, so universal vigilance must be increased (1–3).

Anesthesia service has intense environmental characteristics with a high working hours system, which has a high risk of work accidents, such as exposure to anesthetic gas, drugs, radiation, and exposure to sharp objects during surgery, and can cause pain in the lumbar area due to lengthy surgical procedures. Apart from that, the high number of side effects of post-anesthesia care, the type of surgery, the length of stay of the patients in the PACU, and patient characteristics can cause the workload to increase (4–6).

Excessive workload can cause work stress, which can reduce performance, increase the possibility of negligence when providing patient care, decrease the quality of caring, decrease positive communication, decrease professional skills, and decrease the optimal implementation of knowledge so that the quality of service is less than optimal (7–9).

Data shows that around 34% of nurse anesthetists at the American Association of Nurse Anesthetists (AANA) experience work stress with varying levels of stress ranging from mild, moderate, and severe stress. In addition, 20% of respondents noted frequent fatigue, and 32% reported moderate fatigue (10). Apart from the work environment, health workers in the Central Surgical Installation can experience work stress due to the spread of infection. This is because the operating room is one of the closed rooms most at risk of transmitting disease (11,12).

The density of surgery schedules and their implementation sometimes do not go according to plan, requiring health workers to be ready in any condition 24 hours a day. This is the reason for implementing a system of dividing working hours or what is better known as 3 work shifts (13–15). Most nurse anesthetists' work stress levels are moderate stress (47.1%), mild stress (41.2%), and severe stress (11.7%) (16). The average workload in West Java requires 45.6 minutes of direct nursing care per hour spent in post-anesthesia. It means a relationship exists between workload, type of operation, severity of illness, and available nursing staff (17).

The phenomenon that occurs to nurse anesthetists on a scheduled official holiday can get an emergency surgery scheduled, causing the nurse anesthetist to have to return to the hospital because of it. The work schedule is also different for each hospital; some have 2 shifts with working hours from 7 am to 3 pm and continue to the next shift. Meanwhile, the 3 shifts start from 7 am to 2 pm, the afternoon shift from 2 pm to 9 pm, and the night shift from 9 pm to 7 am. The average number of surgeries in each hospital is around 20-30 patients a day, and the average operating room in each hospital is 5-8 operating rooms. Besides busy scheduling in the operating room, there is also a high risk of work accidents. (5)

METHOD

This research method uses quantitative research with a cross-sectional approach. The population in this study is nurse anesthetists who were members of the West Java DPD of IPAI. The sample for this study was nurse anesthetists who met the inclusion criteria of at least having worked for 3 years. The exclusion criteria in this study were nurse anesthetists who did not work in anesthesia services, nurse anesthetists aged > 55 years, and respondents who graduated with a diploma/bachelor's degree in nursing or "Ners" program without anesthesia training. The sampling technique for this research used non-probability sampling with stratified random sampling with a total sample of 88 nurse anesthetists in the West Java region.

Table 1. Sample Calculation with Stratified Random Sampling

Parts of DPD IPAI Jabar	Formula	Number of Respondents
DPC 1 includes: Bandung City, Bandung Regency, West Bandung Regency, Cimahi City, Sumedang Regency and Cianjur Regency	$n = \frac{197}{765}$ x 88 $n = 22{,}6$	23 respondents
DPC 2 includes: Bogor City, Bogor Regency, Depok City, Sukabumi City and Sukabumi Regency.	$n = \frac{163}{765}$ x 88 $n = 18{,}7$	19 respondents

DPC 3 includes: Bekasi City, Bekasi Regency, Karawang Regency, Purwakarta Regency and Subang Regency.	$n = \frac{182}{765}$ x 88 $n = 20{,}9$	21 respondents
DPC 4 includes Garut Regency, Ciamis Regency, Tasikmalaya City, Tasikmalaya Regency, Banjar City and Pangandaran Regency.	$n = \frac{79}{765}$ x 88 $n = 9{,}08$	9 respondents
DPC 5 includes: Cirebon, Cirebon Regency, Indramayu Regency, Majalengka Regency, and Kuningan Regency.	$n = \frac{144}{765}$ x 88 $n = 16{,}5$	16 respondents
Total sample		88

The research instrument uses a questionnaire about work characteristics and individual characteristics, and a work stress questionnaire with the Maslach Burnout Inventory (MBI) is sent via a Google form connected to a Google spreadsheet. Researchers have modified the MBI questionnaire and it has undergone an expert judgment review by the Head of the DPD IPAI of West Java Province regarding several factors that may contribute to work-related stress among anesthesia personnel in the operating room. It has been tested for validity and reliability using product moment by comparing the results of the r table with the calculated r of 0.213, and all the results are valid. The reliability results using Cronbach's alpha were found to be 0.627, so they are valid. The components of the MBI questionnaire can be seen in the following table:

Table 2. Work Stress Component

No	Component	N	Favorable	Unfavorable	Min Value	Max Value
1.	Work pattern	8	-	1,2,3,4,5	8	31
2.	Work-related stress	6	3	1,2,4,5	6	31
3.	Opinions regarding the need for and willingness to participate in stress-related programs	9	1,2,3,4	5,6	9	25
	Total	23			23	87

Meanwhile, work and individual characteristics can be seen in the following table:

Table 3. Components of Work and Individual Characteristics

No	Work Characteristics	Number of Questions	Individual characteristics	Number of Questions
1.	Working area (DPC IPAI)	5	Sex	2
2.	Kind of hospital	2	Age	4
3.	Type of hospital	4	Marital status	3
4.	Work responsibility	2	Level of education	7
5.	Daily length of work hour	2	Years of work	3
6.	Patient’s ASA	6		

The data analysis used is univariate in descriptive data in frequency, percentage, mean, maximum and minimum values, and standard deviation. Meanwhile, the bivariate statistical analysis uses regression analysis with chi-square. All participants, including parents or guardians for participants under 18, provided informed consent prior to participating in the study. The confidentiality of all participants was strictly maintained throughout the research process.

Ethical Approval

This study was approved by the Health Research Ethics Committee of Muhammadiyah Purwokerto University (Approval Number: KEPK/UMP/67/IV/2024).

RESULTS

This research was carried out in hospitals in the West Java region with a sample of 88 nurse anesthetists. The data on respondents' characteristics was obtained from filling out questionnaires in Google Forms, which were distributed and filled in directly by the respondents. The research univariate data can be seen in Table 4.

Table 4. Respondent's Characteristics (n=88)

Characteristics	N	%
Work Characteristics		
DPC IPAI Working Area		
DPC 1	23	26,1
DPC 2	19	21,6
DPC 3	21	23,9
DPC 4	9	10,2
DPC 5	16	18,2
Kind of Hospital		
State Hospital	64	72,7
Private Hospital	24	27,3
Type of Hospital		
Type A	9	10,2
Type B	62	70,5
Type C	17	19,3
Work Responsibility		
Team	81	92,0
Individual	7	8,0
Daily Length of Work Hour		
8 hours/day	56	63,6
>8 hours/day	32	36,4
Patient's ASA		
ASA I	55	62,5
ASA II	20	22,7
ASA III	7	8,0
ASA IV	3	3,4
ASA V	3	3,4
Individual Characteristics		
Sex		
Male	58	65,9
Female	30	34,1
Age		
25 – 30 years old	31	35,2
31 – 45 years old	36	40,9
46 – 55 years old	21	23,9
Marital Status		
Married	77	87,5
Unmarried	7	8,0
Widow/widower	4	4,5
Level of Education		
3-year diploma in anesthesiology nursing	46	52,3
3-year diploma in nursing with anesthesia training	12	13,6
4-year diploma in anesthesiology nursing	23	26,1
Bachelor in nursing with anesthesia training	7	8,0
Years of work		
3 – 5 years	12	13,6
6 – 10 years	32	36,4
>10 years	44	50,0
Tota	88 respondents	100%

Source: Primary Data

Based on Table 4, it is known that the work characteristics: almost half of the respondents (26.1%) are in DPC 1, most (72.7%) work in state hospitals, most (70.5%), work at type B hospitals, almost all (92%) work in team responsibilities system, most (63.6%) have working hours of 8 hours/day and most (62.5%) often face patients with ASA I. For individual characteristics, most (65.9%) are male, almost half (40.9%) are aged 31 – 45 years, almost all (87.5%) are married, and most (52.3%) are 3-year diploma in anesthesia nursing graduates. Half of the respondents (50%) have a working period of > 10 years.

Average Description of Work Stress Based on Components

The results of the average work stress calculation can be seen in Table 5 below:

Table 5. Description of the average work stress value per item

No	Work Stress Variable	Mean	Min	Max	SD	Stress Category					
						Mild Stress		Moderate Stress		Severe Stress	
						n	%	n	%	n	%
1.	Work Stress	**58,15**	**23**	**87**	**6,322**	**0**	**0**	**72**	**81,8**	**16**	**18,2**
a.	Work pattern	19,01	8	31	3,897	14	15,9	64	72,7	10	11,4
b.	Work-related stress	17,88	6	31	2,486	4	4,5	82	93,2	2	2,3
c.	Opinions regarding the need for and willingness to participate in stress-related programs	21,26	9	25	1,854	0	0	18	20,5	70	79,5

Relationship between work characteristics and work stress

The bivariate analysis results were used to determine the influence of PCC culture on service quality using linear regression analysis. The results show an influence between PCC culture and service quality. The results can be seen in Table 6 below: The bivariate analysis results were used to determine the influence of PCC culture on service quality using linear regression analysis. The results show an influence between PCC culture and service quality. The results can be seen in Table 6 below:

Table 6. Relationship between Work and Individual Characteristics of Work Stress

Variable	Work Stress		P value	Results
	t	Sig		
Work Characteristics				
Working area (DPC IPAI)	-0,923	0,359	> 0.05	No correlation (-)
Kind of hospital	1,209	0,230	> 0.05	No correlation (-)
Type of hospital	-3,073	0,003	< 0.05	There is correlation
Work responsibility	1,111	0,270	> 0.05	No correlation (-)
Daily length of work hour	2,468	0,016	< 0.05	There is correlation
Patient's ASA	-2,545	0,013	< 0.05	There is correlation
Individual Characteristics				
Sex	-1,433	0,156	> 0.05	No correlation
Age	3,126	0,002	< 0.05	There is correlation
Marital Status	-1,908	0,060	> 0.05	No correlation (-)
Level of Education	1,069	0,288	> 0.05	No correlation (-)
Years of work	-5,170	0,000	< 0.05	There is correlation

The results of each component of work characteristics, DPC IPAI work area components, type of hospital, and work responsibilities have no relationship with work stress. Meanwhile, the type of hospital, length of work per day, and patient ASA are related to work stress.

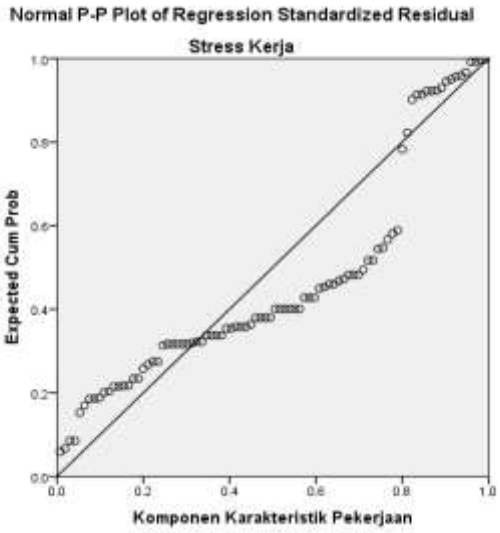

Figure 1. Work Stress Related to Work Characteristics

The work-stress of nurse anesthetists in carrying out anesthesia nursing services in the West Java region experiences moderate stress due to the lack of nurse anesthetists in every existing hospital, uneven working hours, patients with high risk or high ASA classification, and the absence of a stress management forum. held by the hospital.

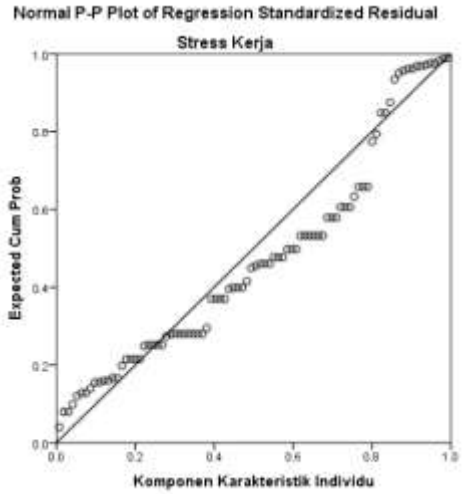

Figure 2. Work Stress Related to Individual Characteristics

Individual characteristics components, which include sex, marital status, and level of education, have no relationship with work stress, while age and years of work have a relationship with work stress. One of the causes of work stress is age. Age greatly affects some works, especially those related to the senses and physical strength. As you get older, your physical condition will decrease, so the possibility of experiencing stress increases. However, for some types of work, older people usually have more experience and understanding than younger people.

DISCUSSION

Work stress is a physical and emotional response caused by a mismatch between work requirements and employee abilities, resources, and desires. This can have negative effects. Intrinsic factors in work, the individual's role in the organization, career development, relationships at work, and company structure and climate are some causes of work stress. Individual characteristics such as length of work, marital status, age, education, and training

can also be causes of work stress. If work stress is not controlled properly, it can lead to decreased productivity, lower work performance, more absences from work, and more turnover, increasing compensation costs (18).

Year of work is a factor that can influence stress levels in the workplace. The longer someone works, the more experience they have and the easier it is to adapt to the work environment. With longer experience, there is less stress from having the same tasks and responsibilities all the time. Years of work can influence stress levels due to experience and the ability to adapt to the workplace. Extensive experience can make you more productive at work (19).

A longer year of work means much more experience, so it can help face and resolve work problems. The expertise possessed by a nurse anesthetist with a long year of work can also help solve problems faced, such as attending high-risk surgery, patients with high ASA levels, and the risk of complications that can occur to patients, which they can managed well and not experience work stress.

A survey of 7,537 certified registered nurse anesthetists in the United States found that the most common clinical symptoms of stress were irritability, anxiety, sensitivity to minor issues, and impatience. High workload, significant responsibilities, and time pressure were major contributors to their stress levels (20). In Central Java, found that 48.7% of anesthesia personnel experienced mild work stress, while 10.3% experienced moderate stress. Factors such as age, gender, work experience, working hours, and education level influenced stress levels.

Overall, factors such as high workload, significant responsibilities, time pressure, and workplace conditions play a crucial role in influencing stress levels among anesthesia personnel in the operating room. Individual characteristics such as age, gender, and work experience also affect how one responds to stress in this environment.

Work stress based on work patterns

The results of research conducted on 88 nurse anesthetists in the West Java region regarding work patterns showed that the majority experienced moderate stress. In the operating room, they had long working hours caused by a heavy workload, which later triggered stress because even after regular working hours, the nurse anesthetists may get a call for emergency surgery if they lack nurse anesthetists. This means many nurse anesthetists in West Java work more than 8 hours daily. This is due to the increasing number of surgical patients and the high ASA classification. (21) Unresolved issues can also cause stress among employees. Physical and mental fatigue due to excessive workload is a potential factor that may trigger burnout (22,23).

This also can happen during holidays when there is insufficient manpower to do the nurse anesthetists' work, and the nurse anesthetists having holiday breaks are summoned to the hospital to help. Administrative aspects that the nurse anesthetist has to deal with also make the work stressful. This is one of the reasons for the incomplete documentation form filling, such as the anesthesia card. The incompleteness of the anesthesia form filling includes 91.5% in the pre-anesthesia stage, 82% in the intra-anesthesia stage, and 79.5% in the post-anesthesia stage (24). Additionally, the Surgical Safety Checklist for the intra-operative phase is often completed at the end, after the surgery (25).

The most commonly reported stressors were related to patient care responsibilities, such as anesthesia complications, drug use, death, and surgical complications. Nurse anesthetists reported administrative stress, such as workload, staffing issues, and work schedules (26). Interpersonal relationships with surgeons, anesthesiologists, other nurse anesthetists, or operating room staff, as well as the closed operating room environment, also contribute to work stress. Work stress and burnout in nurse aneshetist and operating room nurses have similar results. These include an imbalance between activities and demands at home and work, insufficient personal time, inadequate recognition, lower rewards, fear of competition, work insecurity, social and professional isolation, litigation, and co-worker relationships, which are identified as stress factors leading to drug abuse, alcoholism, and even suicide (2,10).

Work stress based on work-related stress

Work-related stress, overall, experienced moderate stress due to the presence of patients who were at high risk. Health workers are very at risk of experiencing work stress because they are constantly required to provide maximum service to patients. A high level of interaction to feel more positive and able to control the surrounding environment with other people can cause a workload that puts pressure on health workers (8,11).

Work stress based on needs and willingness in stress management

Work stress regarding the need and willingness to participate in stress-related programs, experiencing moderate stress. Researchers think the respondents experienced moderate stress due to the hospital management's lack of attention to workers in discussing or holding training for all workers regarding stress management, causing workers to be somewhat unaware of how to handle stress. One way management can reduce the work stress of nurse anesthetists is to improve the work environment by installing cooling equipment and maintaining the air temperature periodically so that the room temperature is always maintained, maintaining the quality and circulation of air in the room (6,16).

The management related to mental health problems or psychosocial stress can be taken care of by the existence of stress management programs, and programs to deal with family and workplace problems, consultations with psychologists. The operating room is a work environment with very different and complex settings that influence nurse anesthetists' physiological, mental, and behavior. Some of the most common complaints from working nurse anesthetists include headaches, cold sweat, palpitations, work dissatisfaction, poor interpersonal relationships, irritability, withdrawal, reduced energy and work productivity, and lack of loyalty (7,27).

Facing stress at work requires individuals to be able to manage stress well. One way of managing stress is through the individual's coping mechanisms against stress. The coping strategies that individuals determine when facing stress will impact the individual themselves, whether positive or negative. Positive coping strategies will moderate the relationship between work and work performance. Negative coping strategies will moderate workload, time, and performance (19,28).

Limitations and Cautions

The results of this research can be useful for increasing knowledge and understanding the factors that influence work stress of nurse anesthetists in providing anesthesia nursing services in the West Java region so actions can be taken to manage work stress. Holding seminars for health workers who work in hospitals, as well as input for the IPAI professional organization, to hold training or seminars on how to deal with work stress.

The limitations of this research are due to the large number of IPAI West Java DPD members, so the data collection method was carried out using a Google form link. Hence, it was less efficient because they could not meet in person when collecting data. Questionnaires were distributed simultaneously using Google Forms, so researchers could not supervise respondents. There were concerns that they would fill in the questionnaire by following colleagues' answers or discussing.

CONCLUSION

This research found that many nurse anesthetists in the West Java region experience moderate work stress. This is due to differences in working hours, type of hospital where you work, work patterns, length of service, working in public or private hospitals, and the lack of seminars or education regarding stress management in the workplace. Besides that, needs to be policy changes such as implementing shift rotation systems, providing regular mental health assessments, or integrating stress management education into nurse anesthetist curricula. Therefore, there is a need for longitudinal studies to assess the long-term effects of work stress interventions, comparative studies across different regions in Indonesia, or qualitative research exploring personal coping strategies used by nurse anesthetists.

AUTHOR'S CONTRIBUTION STATEMENT

Each author participated in the ideation process, reviewed relevant literature, gathered and analyzed data, wrote the paper, and approved the finished product. GSR revised the work and approved it for publication by the other authors.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors declare that generative AI and AI-assisted tools were used only for language editing, grammar correction, and drafting of preliminary sections (e.g., abstract, methods). All substantive content, data analysis, interpretation, and conclusions are solely the authors' work. No AI was used to generate data or make scientific decisions.

CONFLICTS OF INTEREST

There is no conflict of interest for all the authors of this study.

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