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ABSTRACT

This study aimed at examining the factors that contribute to nursing productivity in public hospitals in Surabaya. Data relating to the respondents' characteristics and their productivity were collected using a questionnaire incorporating the Behaviorally Anchored Rating Scale. The samples were drawn from 31 nurses form the emergency room (ER) and 29 nurses from the intensive care unit (ICU) wards of a public hospital in Surabaya, Indonesia, of whom, 52 nurses participated voluntarily and indicated their willingness to respond by signing an informed consent form. The chi-square and Fisher's exact test was used to determine associations between the determinants (demographic characteristics, lifestyle and nutritional status) and productivity and the strength of association was identified by using logistic regression. The results from this study found that gender had borderline significant and duration of work experience had a significant association with nurse productivity. Therefore, gender and duration of working experience are factors which should be taken into consideration when managing human resources working in ERs and ICUs while basic nursing competencies are clearly also important factors in maintaining productivity.

Introduction

Nurses are recognized as the front line of the healthcare system. They underpin all activities in the hospital, and nursing performance is a critical success factor in hospital development (Salmond and Echevarria 2017; Librianty 2018). The job description, of the nurse in the emergency room (ER) and intensive care unit (ICU) defines their duties and responsibilities, which are complex and have a very significant influence on the quality of hospital services provided to the community (Septiani 2016; Halcomb, Smyth, and McInnes 2018).

Nurse productivity is one of the workload factors used to improve and develop hospital service quality. Working productivity depends on various factors including mental attitude, education, skills, management, industrial relations, income, nutrition and health, social security, work environment and work facilities (Sedarmayanti 2011; Terzioglu, Temel, and Uslu Sahan 2016). Another important factor is the working atmosphere, which is one of the most significant causes of occupational stress and can lead to lower productivity, the impact of which may be felt in low-quality services. This case can, in turn, leads to a decline in the number of customers since, generally, customers will tend to move to other better organizations with higher quality service (Borhani et al. 2016; Chaniago 2017).

Previous studies have investigated the influence of demographic characteristics, such as gender (Newman 2014), age (Kaddourah, Abu-Shaheen, and Al-Tannir 2018), and marital status (Li et al. 2019), on work quality and nurses productivity. Proper nutrition and a healthy diet have been found to contribute to accomplishing high productivity (Gubler, Larkin, and Pierce 2018). Williams (2017), in a study of night-shift nurses in the USA, found that some nurses needed to synthesize their work and home environment to be able to deal with the stresses inherent in their

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careers. The paper suggested that hospitals should provide free healthy snacks to counteract a tendency for night nurses to become obese, to combat absenteeism, and to improve the happiness and the productivity of night shift nurses. In addition, a number of previous studies in Jamaica, Kenya, and India have discovered a significant relationship between nutritional status and the productivity of workers (Martorell and Arroyave 1988). Therefore, nutrition status, which can be evaluated using body mass index (BMI; Amani and Gill 2013), and nurse productivity play an essential role in promoting effective routine working in a healthcare institution. Other studies have posited that work duration, work experience, and shift work are all related to productivity (Moradi et al. 2014; Gyllensten, Andersson, and Muller 2017; Ganesan et al. 2019) and that exercise and lifestyle (Sjøgaard et al. 2016), smoking (Ganz et al. 2015), entertainment (e.g. watching television; De Bloom 2012) work facilities and transportation (e.g. urban transit and walking; Chansky and Modica 2018) all influence productivity.

In Indonesia, there were limited studies of nurse productivity and their determinants. Therefore, the study described in this paper investigated the factors affecting nurse productivity by focusing on a public hospital in Surabaya and analyzing the influence of all the factors identified above in previous studies, which are all believed to be important in influencing nurse productivity. The results from this study will be beneficial by suggesting means of improving nursing productivity in Indonesia and also elsewhere in the developing world.

Methodology

Study Design

A cross-sectional study was conducted between July 2018 and May 2019 in Hajj public hospital in Surabaya, Indonesia. The study focused on nurses working in the ER and ICU of which at the time of the study, there were a total of 60, of whom 31 worked in the ER and 29 worked in the ICU wards. Fifty-two nurses were included in this study based on volunteering and being willing to respond to the structured questionnaire which was employed in data collection. The questionnaire consisted of four parts: demographic factors (gender, age, marital status, and BMI), lifestyle and behavior (smoking status, type, frequency and time of exercise, and transportation mode), working factors (duration of working and shift work) and nurse productivity. A pilot test of the questionnaire was performed to evaluate the validity and reliability of the questions before data collection. An informed consent form was attached to the questionnaire when it was distributed to the nurses.

Measurement

Gender was classified as male and female. Marital status was divided into two groups: married and single. The duration of work (i.e. length of working experience) was divided into two groups: 1–9 years and > 9 years. Exercise time was classified into two groups: <1 h and 1–4 h. Exercise frequency was classified into two groups: once a week and 2+ times a week. Transportation mode was divided into two modes: motorcycle and/or public transportation, and car/other. (Motorcycle and/or public transportation in this study included both self-owned motorcycles as well as motorcycles for hire ordered on-line (similar to *Uber*).) The time spent watching television was divided into two categories, 1–3 and 4–6 h per day. Shift work was divided into three categories, morning, afternoon, and night shift. Smoking status was classified into two groups, yes and no. Nutritional status, with BMI as its proxy was measured by weighing and measuring the height of each respondent using height gauges and digital body scales. BMI was classified into two groups: ≤25 and >25.

Nurse productivity data were assessed using the *Behaviorally Anchored Rating Scale* (BARS) questionnaire (Yoder-Wise 2019). The BARS scale is used to rate the performance of employees and is an appraisal mechanism that attempts to integrate the benefits of narratives, critical incidents and quantified ratings by anchoring a quantified scale with specific descriptions of performance ranging from good to satisfactory to unsatisfactory (MBAskool 2019). BARS was

Table 1. Demographic, lifestyle and working factors of the respondents.

Factors	Frequency	Percent
Gender		
Male	22	42.3
Female	30	57.7
Age in years (mean ± SD)	34.7 ± 7.2	
Marital status		
Married	48	92.3
Single	4	7.7
Body mass index		
≤25	30	57.7
>25	22	42.3
Duration of working experience		
1–9 years	24	46.2
>9 years	28	53.8
Exercise time per day		
<1 h	35	67.3
1–4 h	17	32.7
Exercise frequency		
Once a week	41	78.8
2+ times/week	11	21.2
Transportation		
Motorcycle or public transportation	48	92.3
Car/other	4	7.7
Time spent watching television		
1–3 h/day	48	92.3
4–6 h/day	4	7.7
Shift work		
Morning	20	38.5
Afternoon	19	36.5
Night	13	25.0
Smoking status		
Yes	9	17.3
No	43	82.7

introduced by Smith and Kendall in 1963 and is recognized as a reliable and valid method of performance appraisal (Schwab, Herbert, and DeCotiis 1975; Klieger et al. 2018). BARS can accommodate various traditional performance appraisal procedures such as graphic rating scales and the critical incident method (Swaartbooi 2016). In this study, the BARS questionnaire was developed following the method reported by Klieger et al. (2018). It was divided into seven domains to measure the performance of the respondents in delivering effective services, such as initiative and work ethic, communication skills, flexibility and endurance, problem-solving skills, responsibility, and teamwork. Each domain had a criterion, and each nurse responded to items within those domains based on a six-point Likert scale ranging from 1 for extremely ineffective to 6 for extremely effective. The average scale result of the BARS was used to represent the range of nurse productivity from 1, indicating unproductive, to 6, indicating productive. The contents of the questionnaire were clearly explained to all the participants. The independent

variables (gender, age, marital status, nutritional status, duration of work, exercise time, exercise frequency, transportation, time spent watching television, shift work, and smoking status) and the dependent variable (nurse productivity) were analyzed using descriptive statistics including frequencies and percentages.

Statistical Analysis

The Pearson chi-square test was used to test the association between the categorical independent variables and the outcome and *t*-test for the continuous independent variable and the outcome. If expected count less than 5, Fisher's exact test was used instead of a chi-square test. This study is exploratory, and therefore a higher *p* (alpha) value was chosen to avoid ruling out the highly possible association, as is recommended by most leading statistical texts (Fisher 1956; Cohen 1988; Ellis 2010). In this study, the significance is set at $p = 0.1$. The logistic regression was used to identify the strengths of the associations detected.

Results

Table 1 shows details of the demographics, lifestyle and working factors among the sample of nurses who responded to the BARS questionnaire.

The respondents' demographic data showed that more than half the sample of nurses was female, and the average age was 34.7 years old. Furthermore, the majority of nurses were married, and 22 nurses were considered as being overweight with a BMI greater than 25. In respect of their lifestyle, more than 80% of the nurses did not smoke and most exercised for less than an hour once a week. Additionally, almost all the nurses traveled to the hospital by motorcycle rather than walking or using a car and most spent between one and three hours a day watching television. Moreover, more of the nurses worked morning or afternoon shifts rather than the night shift, although the difference in numbers was not significant. Finally, over half of the nurses had more than nine years of working experience.

Table 2. Association between factors and nurse productivity based on chi-square tests.

Factors	Moderately productive (n = 33)	Productive (n = 19)	p Value
Gender			0.084[a]
Male	11 (33.3)	11 (57.9)	
Female	22 (66.7)	8 (42.1)	
Age in years			0.472[b]
Mean (SD)	35.2 (7.6)	33.7 (6.5)	
Marital status			1.000[c]
Married	30 (90.9)	18 (94.7)	
Single	3 (9.1)	1 (5.3)	
Body mass index			0.545[a]
≤25	18 (54.5)	12 (63.2)	
25+	15 (45.5)	7 (36.8)	
Duration of working experience			0.062[a]
1–9 years	12 (36.4)	12 (63.2)	
>9 years	21 (63.6)	7 (36.8)	
Exercise time			0.272[a]
<1 h	24 (72.7)	11 (57.9)	
1–4 h	9 (27.3)	8 (42.1)	
Exercise frequency			0.503[c]
Once a week	27 (81.8)	14 (73.7)	
2+ times/week	6 (18.2)	5 (26.3)	
Transport mode			0.284[c]
Motorcycle or public transportation	29 (87.9)	19 (100)	
Car/other	4 (12.1)	0 (0)	
Time spent watching television			0.617[c]
1–3 h/day	31 (93.9)	17 (89.5)	
4–6 h/day	2 (6.1)	2 (10.5)	
Work shift			0.850[a]
Morning	12 (36.4)	8 (42.1)	
Afternoon	13 (39.4)	6 (31.6)	
Night	8 (24.2)	5 (26.3)	
Smoking status			0.260[c]
Yes	4 (12.1)	5 (26.3)	
No	29 (87.9)	14 (73.7)	

[a]p-value from Pearson chi-square test.
[b]p-value from t-test.
[c]p-value from Fisher's exact test.

Table 3. Result of odds ratio, Wald test, and likelihood ratio test.

Factors	Crude OR (90% CI)	Adj. OR (90% CI)	p (Wald's test)	p (LR-test)
Gender				
Female	1	1		
Male	2.75 (1.04,7.30)	2.56 (0.86,7.65)	0.158	0.154
Duration of working experience				
>9 years	1	1		
≤9 years	3.00 (1.12,8.02)	3.78 (1.22,11.68)	0.053	0.044
BMI				
25+	1	1		
≤25	1.43 (0.54,3.77)	1.7 (0.57,5.09)	0.429	0.424
Work shift				
Afternoon	1	1		
Morning	1.44 (0.48,4.36)	2.66 (0.71,9.98)	0.222	0.447
Night	1.35 (0.39,4.68)	1.48 (0.33,6.63)	0.667	

As can be seen from Table 2, 19 of the 52 nurses were judged to be productive based on their responses to the BARS questionnaire, with the remaining 33 nurses found to be moderately productive. Table 2 also shows the associations between the eleven demographic and lifestyle factors and nurse productivity, gender ($p = 0.084$) and duration of work ($p = 0.062$) approaching significance at the $p < 0.1$ level. In the reproductive group, more than half were males (57.9%) and reported the duration of working experience 1–9 years (63.2%). Both significant factors, gender and duration of work, were added to logistics regression and BMI and work shift also was kept in the model since many previous studies reported that obesity and work shift were potential occupational risk factors which affected productivity (Folkard and Tucker 2003; Barkin et al. 2010; Shrestha et al. 2016; Kudel, Huang, and Ganguly 2018).

Table 3 indicates the results of logistic regression for the factors which were found to have a significant and to be closest to producing significant associations with nurse productivity. The significance contributing to nurse productivity was the duration of work. Nurses with less than ten years working experience were 3.78 times more likely to be productive than those with less than ten-years working experience. The factors which have a borderline significant association with nurse productivity was gender. Male nurses

were 2.56 times more likely to be productive than female nurses. BMI and work shift were not found a significant association with nurse productivity.

Discussion

The present study found that there were no significant associations between the respondents demographic characteristics, age, and marital status and their productivity which was in contrast to the findings of previous studies which have suggested that more mature people, both judged by age and psychological factors related to marriage and physiological needs, tend to be more productive (Ryu and Kol 2002) and that adult workers will be in their most productive period (Kotur and Anbazhaga). It was also suggested that if workers are too young, physiologically, they may not be ready to accept an intense workload. In contrast, when they are mature, workers will have adequate experience. However, other studies have found that age was not the main issue explaining productivity in nurses (Abu Yahya et al. 2019; Li et al. 2019). The study of Olatunji and Mokuolu (2014) found that marital status was one of the factors associated with worker productivity in health-related occupations. However, the present study found the opposite result. A study in China by Ouyang et al. (2019) also suggested that marital status provides a feeling of psychological comfort that can lead to increased performance and productivity. Still, the present study found no evidence that the sense of comfort and security derived from being married was related to productivity.

Prior studies have found that adequate nutrition has a vital role in shaping productivity (Ariati 2013) and that workers in better nutritional condition had a higher working capacity and endurance (Marsetyo and Kartasapoetra, 2005; Reed 2014). For nurses, adequate nutrition measured by the number of calories they consume has been suggested as being the main requirement that determines the level of productivity and their health (Ross et al. 2017). Further, workers of normal weight have been found to be more agile when they work (Mandagi, Umboh, and Rattu 2015; Williams 2017) while other

studies have suggested that nutritional fulfillment is an important factor in achieving better worker productivity (Udonwa and Iyam 2015; Wilda, Aritonang, and Lubis 2017). Worker nutrition, therefore, has been suggested as being a precondition to better productivity and investments by employers in nutrition through increased welfare and human resource development are likely to lead to increases in productivity (Cherniack 2015; Ukkas 2017). Based on the results of the present study, the nutritional statuses of most of the nurses surveyed in the public hospital in Surabaya were normal (i.e. most were not overweight), which suggested that they controlled the nutritional factors which might help to maintain their productivity. However, the study's findings detected no relationship between the nurse nutritional status based on BMI and their productivity. This was in contrast with the findings of prior studies that have found that the nutritional status of workers was strongly associated with work productivity (Bawinto, Malonda, and Kawatu 2016) including studies conducted in factories (Novianti, Kurniawan, and Widjasena 2017) and a cigarette company (Adityana 2014). However, This study's outcome was in line with research conducted among workers in a pulp and paper company in which chi-square test showed that there was no association between nutritional status and labor productivity (Suryani 2015) and previous research in a hospital in Indonesia also found that there was no relationship between the nutritional status of nurses and productivity (Susanti 2014).

Most of the ER and ICU nurses in the public hospital in Surabaya in the present study had normal BMIs, but some nurses were underweight, overweight or obese. Nurses who had BMIs above 25 said that they regularly ate breakfast, lunch, and dinner when feeling hungry, as well as eating snacks and fast food. However, nurses who had low BMIs generally showed higher productivity, although the effect was not significant. It has previously been found that workers with a BMI indicating that they were underweight were less likely to be absent from work and to be more productive because underweight individuals and those with normal BMIs tend to be healthier (Sanchez Bustillos, Vargas, and Gomero-Cuadra 2015).

However, nurses in all categories, underweight, overweight and obese, have been found to have no difficulty in doing their job, for example in carrying and moving patients into a bed since they always work together and because hospital equipment such as adjustable-height beds aided them in their work and allowed them to work normally irrespective of their body weight (Vali et al. 2015).

Previous studies have revealed that exercise habits and lifestyles can affect nurse productivity (Wattles and Harris 2003) and a study of nurses physical fitness found that it was positively related to work performance (Sjøgaard et al. 2016). Further, research in America has also found that nurses fitness has an impact on improving nurses health and thus on their performance, which will be better if they are fitter (Cherniack 2015; Ross et al. 2017). Another study reported that nurses who were physically fit had lower absentee rates than those who were not (Carugno et al. 2012). However, the present research did not find any relationship between physical fitness with productivity, perhaps because healthcare worker in Indonesia conduct regular exercise activities organized by hospitals (Gubler, Larkin, and Pierce 2018).

Physical fitness is also influenced by smoking (Lim and Ha 2019). Contrary to the findings of the present study, some previous studies had indicated that nurses who smoke had lower productivity (Perdikaris et al. 2010; Syamlal et al. 2015) and that smoking is one of the crucial factors affecting worker productivity (Halpern et al. 2001). Several studies have produced similar results with active smokers being found to have lower productivity compared to nonsmokers (Tsai et al. 2005). In the present study, most respondents did not smoke, and of those who did, a larger proportion (5 out of 9) were found to be productive, although the effect was not significant. However, the smoking status may also have effects on other factors, for instance, by passive smoking inflicted upon nonsmokers and also the frequency of doing sports activities (Baker et al. 2017).

This study did not find any relationship between work shifts and productivity, and this result is in line with the study of Heyam, Besher, and Nesreen (2018), which also found that work shifts were not related to nursing productivity (Heyam, Besher, and Nesreen 2018). However, a prior study in Indonesia found that work shifts were related to work performance and productivity. Rizany et al. (2019) and Yestiana et al. (2019) found that workers on daytime shifts showed better performance compared to those working night shifts because the body has proper rest and has sufficient energy for work activities. This was also confirmed by Wijaya and Damayanti (2018), who noted that body condition improved after resting and that adequate energy tends to make nurses more ready to work.

In our study, nurse productivity had a borderline significant association with gender. Similarly, several studies have found that gender was related to productivity and work performance (Hanan 2009; Ramlan et al. 2016; Budu et al. 2019). However, a study conducted by Thulth and Sayej (2015) found no significant association between gender and work performance among 185 nurses in the West Bank in Palestine. This is an interesting issue which needs to be researched and discussed more fully, especially for nurses in ERs and ICUs, since the ability and energy capacity of nurses working in ERs and ICUs is critical in these two workplaces which have unique characteristics that require more strength and experience (Ahmad et al. 2018; Mohammad 2018).

Duration of work experience was significantly associated with nurse productivity. This result is in line with several prior studies (Dehghan Nayeri, Bahabadi, and Kazemnejad 2014; Kousar et al. 2018). Working in an ER or ICU requires experience in specific areas (Gyllensten, Andersson, and Muller 2017). In a previous study (Khamisa et al. 2017), ER, and ICU nurses with longer working experience were noted to be more productive whereas in our study longer working experience led to lower productivity. These contrast results need further exploration. Therefore, both gender and duration of working experience are factors that must be considered by management when selecting nurses to work in an ER or ICU. At the same time, basic nursing competencies must also not be overlooked (Lakanmaa et al. 2015).

Limitations

Further research is necessary to comprehensively evaluate the influence of the working environment and nutritional and lifestyle framework on nurses productivity. This research was an initial study, and further research needs to be conducted with a more significant number of respondents to investigate the factors which affect nurse productivity in ERs and ICUs. An additional limitation of this study was the method used to measure productivity, and future studies should seek to incorporate ways of conducting more objective assessments of productivity.

Conclusions

Being males and having a duration of work experience nine years or lower had higher productivity of nurses in the ER and ICU of the public hospital in Surabaya in which the study was conducted. Understanding the impact of those factors on the productivity of nursing staff is an important issue, which needs to be further investigated to assist stakeholders in developing long-term strategic plans for health services. Gender and duration of working experience are factors which should be taken into consideration when managing human resources working in ERs and ICUs. Basic nursing competencies development is mandatory for maintaining productivity. Finally, it is worth noting that the management of the public hospital in Surabaya in which this study was conducted penalize nurses who do not maintain their productivity level, so this encourages the nurses in the ER and ICU to work effectively, and further studies might also consider the effect of management penalties and incentives on nurses' productivity.

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