an emotional response to anxiety that occurs in a person when there is an anxiety stimulus, such as a study that aimed to see cortisol and anxiety levels in family members of patients treated in the ICU with the result saying that a third of family members experienced anxiety after their loved ones entered the ICU. Many family members also experience depression and post-traumatic stress (Beesley et al., 2018). Knowing that a family member has an acute illness has an emotional impact on a person. Other studies also show that 70% of families of stroke patients experience severe anxiety because of the conditions experienced by families of stroke patients (Sulistyoningsih & Al, 2018). Increased emotion and crying is a process of forgiving oneself when the family has a stroke (A'la, Yosep, & Agustina, 2017). An association between disease representation and distress exists in stroke patients, a meta-analysis showed that stroke patients' perceptions of strong disease identity, acute/chronic times, and emotional responses were significantly and positively associated with anxiety and depression (Pai, Li, Tsai, & Pai, 2019).

This study also shows that the emotional response of the sufferer himself is the fear of being taken to the hospital due to COVID-19. A qualitative study that aims to determine the understanding of Community Emergency Preparedness for Cardiovascular Disease and acute stroke during the COVID-19 Pandemic, obtained information that participants reported concerns about virus transmission. corona in the ambulance and in the hospital. Community members' attitudes and perceived behavioral control to seek emergency cardiovascular care are affected by the COVID-19 pandemic (Robles et al., 2021).

This study also showed that after a stroke occurred, there was a family assessment of the general condition and awareness, symptoms of stroke, urinary symptoms, gastrointestinal symptoms, and musculoskeletal symptoms suffered by the patient, such as: unable to urinate, vomiting, unconsciousness, weakness, feeling unwell, weakness, weak extremities, crossed eyes, facial asymmetry, and aphasia. According to a study that stroke patients experience several things when having a stroke, namely numbness, tilted face, slurred speech, saliva coming out of the mouth and paralysis (Luan, Yang, Huang, & McDowell, 2021). Sudden speech difficulties and sudden weakness on one side are the most frequently identified symptoms (Krishnamurthi et al., 2019). Speech/language impairment was the only factor independently associated with patient first aid (Soto-Cámara et al., 2019).

This study also shows that the family's knowledge (cognitive) is knowing, doubtful/not sure, and not knowing. A study showed that the better the family's knowledge about pre-hospital stroke detection, the faster the time of arrival at the hospital (Ainiyah, Izzah, Zahroh, Bistara, & Faizah, 2021). There is a relationship between family knowledge about risk factors and early symptoms of stroke and family behavior in the early treatment of stroke. The higher the value of family knowledge, the better the behavior of the family (Rosmary & Handayani, 2020). The patient's interpretation of symptoms is also important: when they think the situation cannot be self-managed, first aid is reduced to 253 minutes (Soto-Cámara et al., 2019).

Intervention by the family at home are to provide first aid and care. The first aid given included lifting the patient, bringing him to the puskesmas, bringing him to the hospital, slapping his face, measuring blood pressure, taking medicine, being given coconut water, not being taken to the hospital. Treatment given by feeding, providing comfort, telling rest/sleep. One study reported that they would call an ambulance, the most appropriate course of action, if they saw someone suffering from stroke symptoms (i.e., impaired vision, speech problems, numbness or one-sided weakness). The second most common course of action is to advise the person to see a doctor instead of consulting a doctor immediately, About 1/3 would recommend bed rest and 1/10 would suggest drinking water (Luan et al., 2021).

Participants who recognized more stroke symptoms performed each action more frequently, indicating a positive relationship between symptom recognition and action. With regard to calling an ambulance, any additional symptoms are recognized. It is likely that calling an ambulance is the most frequent course of action (Luan et al., 2021). However, this study shows that the average patient's family immediately takes stroke sufferers using their private vehicles.

Home care of the patient is the most common response to participate in regular or increased physical activity followed by eating more fruits and vegetables/having a healthier diet and quitting smoking, reducing salt intake, and a small percentage not knowing how to reduce the chance of having a stroke (Krishnamurthi et al., 2019). Knowledge of relatives that stroke is a disease that requires immediate treatment (Ningsih, Andarini, & Rachmawati, 2020). Misjudgment of symptom onset or poor awareness of stroke symptoms and emergency pathways (Pulvers & Watson, 2017). This includes family support when having a stroke, the support provided by the family can improve the patient's quality of life (Maryam, Resnayati, Riasmini, & Mambang Sari, 2018).

Medical treatment

The second theme is medical care, which consists of the distance from the health facility to the house and the time lag for receiving therapy in the hospital. The distance of health facilities is 300 m, 1 km, 4 km in the results of this study. A study revealed that there was no effect of location distance on the delay in arrival of patients after an acute ischemic stroke in the UGD (Ningsih et al., 2020). The results showed that the time lag at home to the hospital was 2 hours 30 minutes, 30 minutes, 1 hour, 2 hours,

1 month, while the time lag from referral was 30 minutes and 1 day. A review article revealed that the average time to admission and the percentage of stroke patients arriving before the logistically critical 3 hours have shown a slight increase in the last two decades. The main factors that affect prehospital time are related to emergency medical lines, stroke symptoms, patient and bystander behavior, patient health characteristics, and awareness of stroke treatment (Pulvers & Watson, 2017). Severe stroke is one of the reasons patients are quickly taken to the hospital. Other factors associated with early arrival were related to stroke symptoms, stroke subtype, comorbidities, behavior or perception of patients and/or observers at stroke onset, and stroke onset time (Pulvers & Watson, 2017). The top three factors associated with late arrival were the general practitioner or primary care facility was visited first, referral from another hospital, and living alone (Pulvers & Watson, 2017).

The results of this study indicate that family knowledge is one of the causes of patients being immediately taken to the hospital, but because of covid 19, there is a fear of patients going to the hospital. Another important supporting factor is the delay in referral from primary care to the hospital so that patients are late in getting help.

Conclusion

Family experience in carrying out treatment during prehospital stroke is very important, where knowledge about stroke needs to be considered in prehospital stroke management. The more family knowledge increases, the sooner stroke patients are brought to the hospital. So as to reduce patient treatment delays, primary care also needs attention. Specifically in terms of making referrals to hospitals, in this study, training for primary care workers needs to get attention so as not to delay bringing patients to the hospital. After this research was conducted, the recommendation from the researchers was increasing the knowledge of the families of patients who are at risk of stroke is very important as well as a good training for primary health workers in following up stroke patients.

Acknowledgments

Acknowledgments are given to the research funding sources, namely the Direktorat Sumber Daya Direktorat Jendral Pendidikan Tinggi Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi and to all colleagues from the Universitas Sembilanbelas November Kolaka, the Benyamin Guluh Kolaka Hospital and all parties involved who are not mentioned one by one that supports the implementation of this research activity. The authors would like to express gratitude to the Direktorat Sumber Daya Direktorat Jendral Pendidikan Tinggi Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi Indonesia for providing grants for this research.

References

A'la, M. Z., Yosep, I., & Agustina, H. R. (2017). Pengaruh bereavement life review terhadap kesejahteraan spiritual pada keluarga pasien stroke. *Jurnal Keperawatan Padjadjaran, 5*(2), 214–226. https://doi.org/10.24198/jkp.v5i2.526

Afiyanti, Y., & Rachmawati, I. N. (2014). *Metodologi penelitian kualitatif dalam riset keperawatan.* PT Raja Grafindo Persada.

Ainiyah, N., Izzah, S. R., Zahroh, C., Bistara, D. N., & Faizah, I. (2021). Family knowledge on prehospital stroke detection correlates with hospital arrival time in stroke patients at the naval hospital dr. ramelan, surabaya. *Nurse and Holistic Care, 01*(02), 73–81. https://doi.org/10.33086/nhc.v1i2.2221

Batubara, S. O., & Tat, F. (2016). Hubungan antara penanganan awal dan luasnya kerusakan neurologis pasien stroke di RSUD Kupang. *Jurnal Keperawatan Soedirman, 10*(3), 143–157. https://doi.org/10.20884/1.jks.2015.10.3.627

Beesley, S. J., Hopkins, R. O., Holt-Lunstad, J., Wilson, E. L., Butler, J., Kuttler, K. G., … Hirshberg, E. L. (2018). Acute physiologic stress and subsequent anxiety among family members of ICU patients. *Critical Care Medicine, 46*(2), 229–235. https://doi.org/10.1097/CCM.0000000000002835

Bray, B. D., Ayis, S., Campbell, J., Cloud, G. C., James, M., Hoffman, A., … Rudd, A. G. (2014). Associations between stroke mortality and weekend working by stroke specialist physicians and registered nurses: Prospective multicentre cohort study. *PLoS Medicine, 11*(8), 1–11. https://doi.org/10.1371/journal.pmed.1001705

Dinkes Kab. Kolaka. (2020). *Profil kesehatan kabupaten Kolaka 2020*. Kabupaten Kolaka: Dinas Kesehatan Kabupaten Kolaka.

Edward C Jauch, Jeffrey L Saver, Harold P Adams Jr, Askiel Bruno, J J Buddy Connors, Bart M Demaerschalk, Pooja Khatri, P. W. M. J., Qureshi, A. I., Rosenfield, K., Scott, P. A., Summers, D. R., Wang, D. Z., … Yonas, H. (2013). Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke, 44*(3), 870–947. https://doi.org/10.1161/STR.0b013e318284056a

Grove, S. K., Gray, J. R., & Burns, N. (2015). *Understanding nursing research: Building an evidence-based practice.* St. Louis M Saunders Elsevier.

Kemenkes RI. (2013). *Riset kesehatan dasar.* Jakarta: Kementerian Kesehatan Republik Indonesia.

Kemenkes RI. (2014). *Profil kesehatan Indonesia tahun 2013.* Jakarta: Kementerian Kesehatan

Republik Indonesia.

Krishnamurthi, R. V., Barker-Collo, S., Barber, P. A., Tippett, L. J., Dalrymple-Alford, J. C., Tunnage, B., … Feigin, V. L. (2019). Community knowledge and awareness of stroke in new zealand. *Journal of Stroke and Cerebrovascular Diseases, 29*(3), 1–9. https://doi.org/10.1016/j.jstrokecerebrovasdis.2019.104589

Lewis, Dirksen, Heitkemper, & Bucher. (2014). *Medical surgical nursing assessment and management of clinical problems (Ninth).* Elsevier Mosby.

LoBiondo-Wood, G., & Haber, J. (2014). *Nursing research : Methods and critical appraisal for evidence-based practice. In Nursing Research (8th ed.).* Mosby Elsevier.

Luan, S., Yang, Y., Huang, Y., & McDowell, M. (2021). Public knowledge of stroke and heart attack symptoms in China: A cross-sectional survey. *BMJ Open, 11*(1), 1–8. https://doi.org/10.1136/bmjopen-2020-043220

Maryam, R. S., Resnayati, Y., Riasmini, N. M., & Mambang Sari, C. W. (2018). Effect of family support intervention towards quality of life with elderly's hypertension in community. *Jurnal Keperawatan Padjadjaran, 6*(3), 281–288. https://doi.org/10.24198/jkp.v6i3.670

Mesiano, T. (2017). *What's your reason for preventing stroke.* Kementerian Kesehatan Republik Indonesia.

Ningsih, D. K., Andarini, S., & Rachmawati, D. (2020). Incident location distance and transportation to hospital delayed arrival patients post-acute ischemic stroke attack in emergency department east Java-Indonesia. *Indian Journal of Public Health Research & Development, 11*(12), 244–249. https://doi.org/10.37506/ijphrd.v11i12.13244

Pai, H. C., Li, C. C., Tsai, S. M., & Pai, Y. C. (2019). Association between illness representation and psychological distress in stroke patients: A systematic review and meta-analysis. *International Journal of Nursing Studies, 94*, 42–50. https://doi.org/10.1016/j.ijnurstu.2019.01.015

Pulvers, J. N., & Watson, J. D. G. (2017). If time is brain where is the improvement in prehospital time after stroke? *Frontiers in Neurology, 8*(617), 1–9. https://doi.org/10.3389/fneur.2017.00617

Robles, M. C., Corches, C. L., Bradford, M., Rice, T. S., Sukul, D., Springer, M. V., … Skolarus, L. E. (2021). Understanding and informing community emergency cardiovascular disease preparedness during the covid-19 pandemic: Stroke ready. *Journal of Stroke and Cerebrovascular Diseases, 30*(2), 105479. https://doi.org/10.1016/j.jstrokecerebrovasdis.2020.105479

Rosmary, M. T. N., & Handayani, F. (2020). Hubungan pengetahuan keluarga dan perilaku keluarga pada penanganan awal kejadian stroke. *Holistic Nursing and Health Science, 3*(1), 32–39. https://doi.org/10.14710/hnhs.3.1.2020.32-39

Smeltzer, S. C., Bare, B. G., Hinkle, J. L., & Cheever, K. H. (2010). *Brunner & Suddarth's text book Of medical surgical nursing (Twelfth)*. New York: Wolter Kluwer.

Soto-Cámara, R., González-Santos, J., González-Bernal, J., Martín-Santidrian, A., Cubo, E., & Trejo-Gabriel-Galán, J. M. (2019). Factors sssociated with shortening of prehospital delay among patients with acute ischemic stroke. *Journal of Clinical Medicine, 8*(10), 1–12. https://doi.org/10.3390/jcm8101712

Sulistyoningsih, T., & Al, E. (2018). Pengaruh peran perawat sebagai edukator terhadap kecemasan keluarga pasien stroke di unit stroke rumah sakit panti waluya Malang. *Journal Nursing News, 3*(1), 31–37.

Wirawan, N., & Putra, I. B. K. (2009). Manajemen prehospital pada stroke akut. Universitas Udayana, Indonesia.

The Effect of Earmuff and Earplug Use on Preterm Infants Towards Oxygen Saturation and Pulse

Deswinda Deswinda[1*], Dini Maulinda[1], Bayhakki Bayhakki[2]

[1*]Department of Maternity and Paediatric Nursing, Payung Negeri Institute of Health Science, Pekanbaru, Indonesia
[2]Department of Medical-Surgical Nursing, Faculty of Nursing, Riau University, Indonesia

Abstract

Background: A bright circumstance, cold temperatures with loud noise and many activities around can influence oxygen saturation and pulse in preterm baby.
Purpose: This study aimed to identify the effect of using earmuffs and earplugs on the physiological response of preterm infants.
Methods: This crossover study involved 15 medically stable preterm infants treated in a closed incubator. It used the consecutive sampling technique where the babies' physiological response using Neonatal Pulse Oximetri was observed for 30 seconds every 15 minutes for two hours of using earmuffs and earplugs.
Results: The result of repeated ANOVA analysis showed that there is no significant difference of pulse repetition frequency before, during, and after using the earmuff and earplug to preterm infants. Meanwhile, statistically, there was a difference in the mean of oxygen saturation during and after using the earmuff with p = 0.019.
Conclusion: The use of ear protection (earmuff and earplug) could assist and support premature infants in maintaining physiological condition. Earplugs are considered better than earmuffs for maintaining a preterm infant's physiological condition.

Keywords: earmuffs; earplugs; premature; physiological responses.

Jurnal Keperawatan Padjadjaran (JKP)

Volume 10(1), 8-14

http://dx.doi.org/10.24198/jkp.v10i1.1922

Article Info

Received : November 20, 2021
Revised : January 13, 2022
Accepted : January 24, 2022
Published : April 7, 2022

Corresponding author

Deswinda Deswinda
Department of Maternity and Paediatric Nursing, Payung Negeri Institute of Health Science, Pekanbaru, Indonesia, Phone: +628127544629, E-mail: deswinda@payungnegeril.ac.id

Citation

Deswinda, D., M,Dini., & Bayhakki, B.(2022). The Effect of Earmuff and Earplug Use on Preterm Infants Towards Oxygen Saturation and Pulse. *Jurnal Keperawatan Padjadjaran, 10*(1), 8–14. http://dx.doi.org/ 10.24198/jkp.v10i1.1922

Website

http://jkp.fkep.unpad.ac.id/index.php/jkp

E-ISSN: 2442-7276
P-ISSN: 2338-5324

Introduction

Preterm birth is one of the contributors of high neonatal mortality rate in Indonesia, making Indonesia as a country with the 5th leading preterm birth accounted for 675,700 people. While being nurtured, the physical conditions of the treatment room such as the light, the sound, the temperature, the activities nearby, and the room arrangement have a certain impact on the infant's development (Altimier et al., 2015). The NICU room is frequently illustrated as a noisy place due to unexpected noise from the alarm, ventilators, phone, and staff conversation which are truly susceptible to preterm infants (Beal, 2006).

American Academy of Pediatric recommends a noise level of <45 dB in the NICU room, yet the noise level often exceeds this standard. A sudden loud noise has proven to trigger immediate physiological effects such as increased heart rate, blood pressure, respiration and sleep cycle issue, and an increase on the intracranial pressure (ICP) as well as affecting the development of long-term neurodevelopment like language and hearing development (Wachman & Lahav, 2016). Noise contributes to sleep disorders, hearing damage, and decreased oxygen saturation that could have negative impacts on the development of the nervous system (Ranganna & Bustani, 2011). An attempt to reduce noise received by each infant can be accomplished by using earmuffs or earplugs that are designed to adjust the infants' head or using a tool to muffle noises on the incubator cover (Almadhoob & Ohlsson, 2020).

Based on the preliminary research, the noise level of the room ranged

from 55 to 90 dB. While inside the incubator, its level ranged from 58 to 75 dB. The measurement was conducted using the 4-in-1 digital multifunction environment meter. This condition is unquestionably not in line with the American Academy of Pediatric recommendation that limits noises in NICU rooms to around 45 Db. Therefore, most of the preterm infants in the incubator are not protected from the noises around. This study aimed to identify the effect of using earmuffs and earplugs on the physiological response of preterm infants. Earmuffs and earplugs are individual interventions that reduce noise up to 22dB compared to general interventions by modifying the environment which only reduces noise by 6–8 dB.

Methods

Design

This study used a crossover study design where respondents received more than one intervention (Polit, D.F., Beck, 2016). With this research design, the research subjects had control over themselves. This study was carried out from September to November 2017. Each respondent with an odd number initially used earmuffs (treatment A), while each respondent received an even number used earplugs (treatment B). This treatment using earmuffs and earplugs was completed in two hours. There was a break (washout phase) between the first and the second treatment to avoid the effect of the first treatment on the next treatment. The treatment was stopped for 24 hours and hereafter, each respondent received a reverse treatment. Respondents with odd numbers received treatment B whereas treatment A was given to respondents with even numbers. The effect of the treatment was then compared.

Setting and Sample

This study was conducted in the Perinatology rooms of several hospitals in Riau province: Petala Bumi Hospital, Bangkinang Hospital, Selasih Kerinci Hospital, Eria Bunda Mother and Child Hospital, and Mother and Child Hospital of Andini, Pekanbaru. Those hospitals were chosen because the noise intensity at each hospital is not yet consistent with the American Academy of Pediatric recommendation. This is known from noise level measurements carried out by researchers in the perinatology room in each hospital. The population of this study was premature infants who had been undergoing treatment at the neonatal care in 5 hospitals in Riau Province. Inclusion criteria for this research were: infant with gestational age between 28 to less than 37 weeks, infant had been treated in a Neonatal Intensive Care minimum in 2 days, infant did not use any mechanical ventilation and was under a tight control of blood gas analysis, infant was in level 2 that needed a higher level of care and infant was under a closed incubator treatment. Based on the inclusion criteria and preliminary research, the sample size was determined using the paired mean difference formula. 15 Preterm infants were taken as samples using a consecutive sampling technique and none of the samples was dropout.

Instruments

In this study, the researchers used the Anderson Behavioral State Scale (ABSS) with a kappa value of 0.85, which has been used by previous researchers (Syahreni, 2010). To ensure the instrument validity of oxygen saturation and pulse frequency, the researchers used the measuring tools utilized by the hospital in which they had been initially calibrated. Observation sheets A and B were also used. Observation sheet A encompassed data of respondents' characteristics including gender, gestational age, and chronological age. Whereas observation sheet B covered data on physiological function such as oxygen saturation and pulse frequency based on the measurement time. The tools utilized in the study were 1) Earmuffs from Em's 4 Bub that is designed to protect babies from noises. It was equipped with a headband to fit babies' head. 2) The earplugs used was child-sized soft moldable

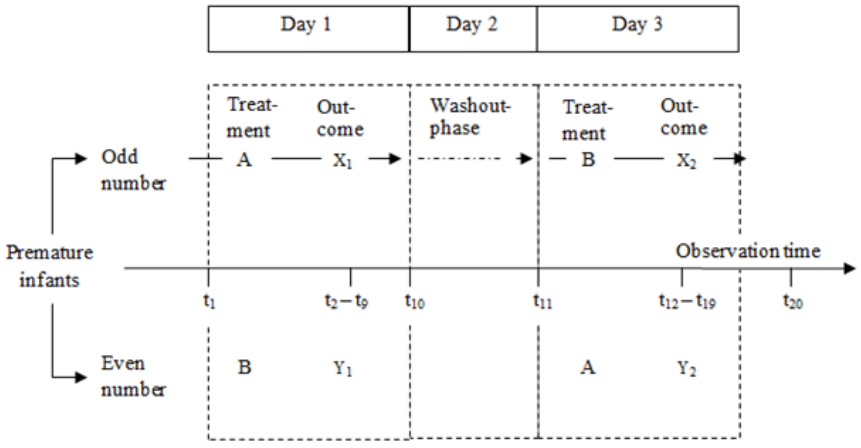

Figure 1. Cross-Over Design

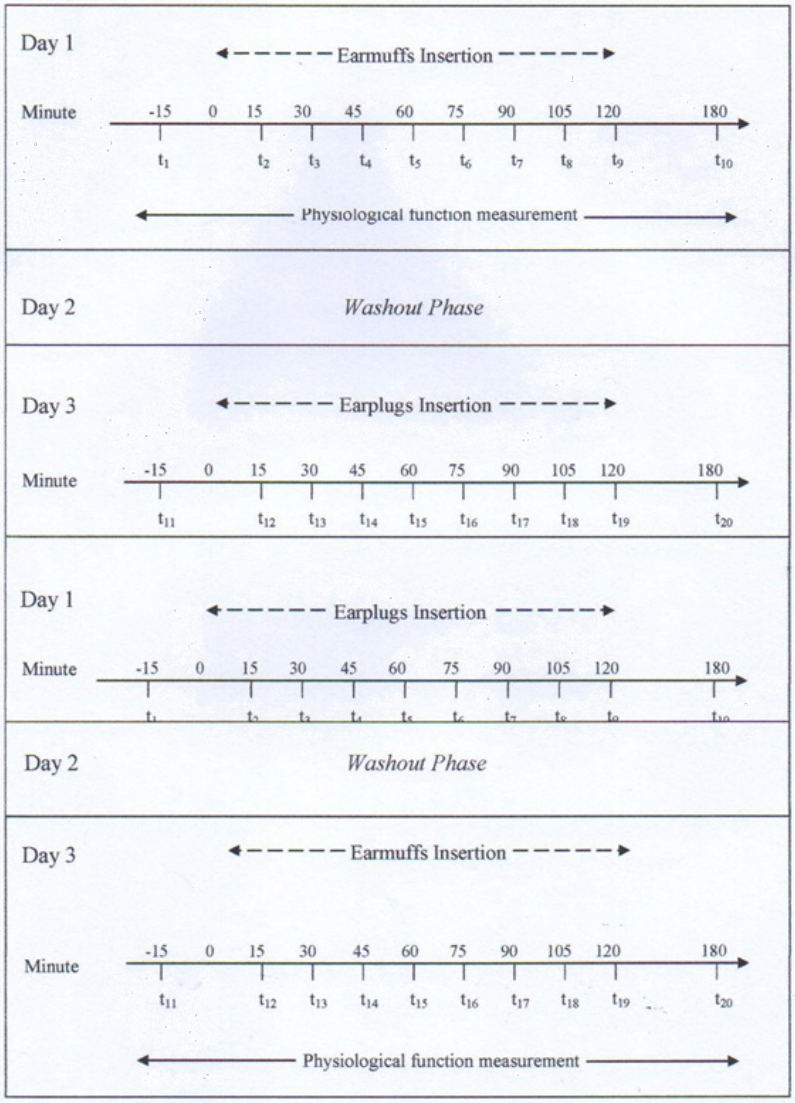

Figure 2. The Measurement on Physiological Function of Respondents with Even Number

silicone from Mack's Earplugs produced by McKeon Products, Inc. USA which has complied with the Environmental Protection Agency (EPA) standard with ANSI S.319 as hearing protection equipment. 3) Neonatal pulse oximeter used in the nursery 4) The 4 in 1 digital multi-function Environment Meter to measure noise level of a room. This tool is designed by combining the function of a sound level meter, light meter, humidity meter and thermometer.

Data Collection and Procedure

The following is the data collection process: 1) First, the infants were given an odd and even number. On the first day, babies with odd number used earmuffs while the ones with even number used earplugs. 2) Second, the physiological function was measured by recording the result of measurement of the oxygen saturation and pulse frequency from the monitoring screen on at (t1), which was 15 minutes before inserting the earmuffs, every 15 minutes for 2 hours of wearing earmuffs (t2-t¬9), and after 60 minutes, the earmuffs were removed (t10). 3) The second day was the washout period when the infants did not wear any earmuff or earplug. 4) On the third day, infants with odd number wore earplugs while the ones received even number wore earmuffs. 5) Physiological function measurement was accomplished on the third day. The oxygen saturation and pulse frequency were recorded from the monitoring screen at (t11); that was 15 minutes before inserting the earmuffs, every 15 minutes for 2 hours of wearing earmuffs (t12-t¬19), and after 60 minutes, the earmuffs were removed (t20).

Data Analysis

Univariate analysis was conducted to understand the frequency distribution as well as to check the percentage and proportion of each variable. The characteristics of variables analyzed in this study include gender, gestational age, chronological age, oxygen saturation, and pulse frequency. Gender was explicated by using frequency distribution and

Table 1. Respondent Distribution Based on Their Characteristics, Oxygen Saturation, and Pulse Frequency (n=15)

Variable	Mean ± SD	Median (min-max)	95% CI
Gestational age	32.33 ± 2.38	32 (28–36)	31.02–33.65
Chronological age	7.22 ± 5.60	6 (2–25)	4.16–10.36
Oxygen saturation Earmuffs			
Before	96.67 ± 1.50	97(94–99)	95.83–97.49
During	96.53 ± 2.64	97(90–100)	95.07–97.99
After	96.00 ± 2.33	96 (92–99)	94.71–97.29
Oxygen saturation Earplugs			
Before	96.67 ± 2.64	98 (91–100)	95.20–98.12
During	97.09 ± 1.67	97.5 (93–99)	96.16–98.01
After	95.80 ± 2.81	96 (90–100)	94.24–97.35
Pulse frequency Earmuffs			
Before	141.13 ± 19.56	135 (100–167)	130.30–151.96
During	140.45 ± 14.67	139.75 (121.13–161)	132.32–148.57
After	139.2 ± 15.03	135 (115–174)	130.87–147.52
Pulse frequency Earplugs			
Before	147.53 ± 16.94	146 (130–186)	138.15–156.91
During	142.38 ± 16.25	147.38 (112–162)	133.38–151.38
After	146.60 ± 17.45	147 (117–172)	136.93–156.26

Table 2. Respondent Distribution Based on Gender (n=15)

Variable	Frequency	Percentage (%)
Gender		
Male	8	53.3
Female	7	46.7

Table 3. The Comparison of the Mean of Oxygen Saturation Before, During, and After Using the Earmuffs and Earplugs (n=15)

Oxygen Saturation of Preterm Infants		Mean ± SD	95% CI	p value
Earmuffs	Before	96.67 ± 1.496	95.838-97.495	0.506
	during	96.53 ± 2.642	95.070-97.997	
	after	96.00 ± 2.329	94.710-97.290	
Earplugs	before	96.67 ± 2.636	95.206-98.127	0.017
	during	97.09 ± 1.674	96.165-98.019	
	after	95.80 ± 2.808	94.245-97.355	

Note: Repeated Anova Test

percentage which are considered as categorical data. Meanwhile, numerical variables such as gestational age, chronological age, oxygen saturation, and pulse frequency were analyzed using the mean, median, standard deviation (SD), as well as the minimum and maximum value at the 95% significance level (α = 0.05). The statistical test in the bivariate analysis is determined based on the assumptions that must be met for each statistical test using repeated measures ANOVA and Pairwise comparison test. All variables were tested for their normality by using the Shapiro Wilk test.

Ethical Consideration

The study was approved by the Health Research Ethics Committee, Faculty of Nursing Indonesia University, Jakarta, Indonesia (approval no.191/UN2.F12.D/HKP.02.04/2017) and written informed consent was obtained from each participant before data collection was conducted.

Results

Respondent characteristics analyzed in this study

Table 4. The Comparison of the Mean of Oxygen Saturation Before, During, and After Using Earmuffs (n=15)

Oxygen Saturation of Preterm Infants		Mean Difference (95%CI)	p value
Earmuffs	Before vs during	0.133(-1.603-1.870)	1.000
	Before vs after	0.667(-0.983-2.316)	0.871
	During vs after	0.5339(-0.964-2.031)	1.000
Earplugs	Before vs during	-0.425(-1.846-0.996)	1.000
	Before vs after	0.867(-1.080-2.813)	0.739
	During vs after	1.292(0.193-2.391)	0.019

Note: Pairwise Comparison Test

Table 5. The Comparison of the Mean of Pulse Frequency Before, During, and After Using the Earmuffs and Earplugs (n=15)

Pulse Frequency of Preterm Infants		Mean	SD	95% CI	p value
Earmuffs	Before	141.133	19.555	130.304-151.963	0.893
	during	140.450	14.668	132.327-148.573	
	after	139.200	15.029	130.877-147.523	
Earplugs	before	147.53	(16.9)	138.154-156.912	0.116
	during	142.38	(16.2)	133.386-151.381	
	after	146.60	(17.4)	136.938-156.262	

Note: Repeated Anova Test

were described based on the type of data, numerical and categorical data. Numerical variables consisting of gestational age, chronological age, oxygen saturation, and pulse frequency were analyzed using the mean, median, standard deviation (SD), as well as the minimum and maximum value at the 95% significance level (α = 0.05).

The number of male premature infants was almost the same as the females as illustrated in the following table.

The result of bivariate analysis on the comparison of the mean of oxygen saturation before, during, and after using the earmuffs and earplugs using repeated ANOVA test shows that the highest mean of oxygen saturation of premature infants using earmuffs was before the earmuffs used. The second highest mean was obtained during the use of earmuffs and lastly after its use. Further, the statistical test result done to compare oxygen saturation before, during, and after using the earmuffs designates that H0 was rejected. This implies that there was no significant difference in the oxygen saturation of premature infants before, during, and after using the earmuffs (p=0.506). Moreover, the highest mean of oxygen saturation on premature infants with earplugs was gained while using the earplugs. The second highest mean was before using earplugs and the lowest was after using earplugs. The results can be seen in Table 3 below.

The result of the pairwise comparison test to compare the mean of oxygen saturation before, during, and after using the earplugs indicates that the mean of oxygen saturation statistically had at least two different means (p=0.017). The significance value of the comparison for the second and the third measurement was < 0.05 (p=0.019). There was a different mean of oxygen saturation during and after using the earplugs. Further detailed result can be seen in Table 4 below.

The highest mean of pulse frequency on premature infants with earmuffs was gained before the earmuffs were used. The second highest mean was obtained during the use of earmuffs. After its use, the mean was lower. The result of the statistical test used to compare the mean of pulse frequency before, during, and after using the earmuffs shows no significant difference (p=0.893). Meanwhile, the mean of pulse frequency of preterm infants from the highest to the lowest was obtained consecutively before, after, and during the use of earplugs. The statistical test employed to contrast the mean of pulse frequency before, during, and after using the earplugs also results in no substantial difference with p=0.116. The result is further explicated in the following table below.

Discussion

Respondents in this study were premature infants who were nursed at several hospitals in Pekanbaru and its neighborhood such as Petala Bumi Hospital, Bangkinang Hospital, Selasih Kerinci Hospital, Eria Bunda Mother and Child Hospital, and Mother and Child Hospital of Andini, Pekanbaru. The samples in this study were infants who were born fewer than 37 weeks with an average gestational age of 32.33 weeks. Premature infants were born with organ immaturity so that the environment as well as the use of medical tools in the hospital room are excessive stimulus and can cause prolonged stress on the preterm infants (Tilly Reid, 2001). The

noise intensity of the treatment rooms for infants in this study was high with an average noise level of 56,31 dB. According to Hassanein et al. (2013), cardio-respiratory equipment alarms could increase noise intensity to 73 dB, endotracheal suctioning to 68 dB, and the sound of telephone ringing to 83 dB. Reducing the noise received by infants is one of the ways that can be done to diminish sensory stimulation (Pineda, 2015).

Premature infants born before 28 weeks' gestation also have an immature auditory system. Premature infants are unable to coordinate autonomic response towards the environment and tactile stimulation until 32–34 weeks of gestation. They need more energy to optimize the immature organs. The infants do not have a strong ability to adapt, thus assistance and support by using earmuffs or earplugs could help reduce noise intensity received by the baby. Nurses play a role in diminishing noise intensity and create a healing environment which allows the infants to maintain energy for their growth and development.

The mean chronological age of respondents in this study was 7.26 days. The increase in the chronological age of premature infants is expected to enable them to respond to any stimuli received from the surroundings just as what occurs in the neonatal care. In this study, the preterm infants were at least 2 days old to be able to be involved in the study with an estimate that they had passed the transition period and had received minimum treatment or medical intervention as the first attempt to save life.

Gender is not a factor that influences premature infants. The research result shows that there were almost similar numbers of male and female infants. This is in accordance with a study conducted by Joshi & Tada, (2017) revealing that there is no significant effect of gender to pulse frequency, respiratory rate, or oxygen saturation.

The average of oxygen saturation of premature infants in this research proves no significant difference before, during, and after using the earmuffs. It is consistent with a study by Duran et al. (2012) reporting no significant difference of oxygen saturation to 20 babies using earmuffs involved in the study with p=0,55. The measurement was carried out during babies' rest where they did not receive any treatment that could disturb the babies. That measurement agrees with Abdeyazdan et al., study (2014) disclosing a decrease on oxygen saturation that occurred to the control group (without earmuffs) was due to an increase on activities in the room such as medical visits (e.g. doctor check-ups and routine treatment given to babies) which eventually cause a higher noise level. This is where nurses have an important role to provide earplugs to premature babies so that they are not disturbed by environmental activities around them.

The use of earplugs, on the other hand, shows significant differences during and after its use. An increase in oxygen saturation during the use of earplugs indicates that the earplugs do not interfere with the position of the premature infants. The use of earplugs consistent with the infants' age will not interfere the treatment routine nor cause any obstacle, resuscitation process, and not injure the infants (Eman A, 2017). In addition, adjusting sleeping position both in supine or quarter prone position affords comfort and increases the infants oxygen saturation (Utario, 2017).

The result of this study also designates that there is no significant difference of the mean of pulse frequency before, during or after using the earplugs or earmuffs. The mean of pulse frequency is 140.45 for earmuffs and 142.3 for earplugs. Grounded on the researchers' observation, the premature infants' pulse frequency is not too fluctuated as the study is conducted when the infants are taking a rest. This suggests that during the study, the infants do not receive any intervention, especially the ones that could stimulate pain disrupting physiological stability. The strength of this research is that the equipment used complies with the Environmental Protection Agency (EPA) standard, which has ANSI S.319 as hearing protection equipment. These earmuffs and earplugs can reduce sound entering the ear (Noise Reduction Rating – NRR) by 22 decibels. However, the limitation of this study lies in the difficulty of finding samples that match the established criteria. Nurses are expected to put earplugs on premature babies as an intervention to overcome the noise of the care environment.

Conclusion

The use of earplugs on preterm infants could significantly improve oxygen saturation. It explicates that the earplugs do not interfere with the infants' position. Additionally, the use of earplugs on preterm infants is better compared to earmuffs. The use of earplugs consistent with the infants' age will not interfere the treatment routine nor cause any obstacle, resuscitation, and not injure the infants. However, there is no significant difference in the mean of pulse frequency before, during or after using the earplugs or earmuffs.

Declaration of Conflicting Interests

The authors declare no conflict of interest in this study.

Acknowledgment

The researchers would like to express gratitude to the Director of Public Hospitals and Mother and Child Hospitals in Riau who have allowed our team to conduct research.

Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

Abdeyazdan, Z., Ghassemi, S., & Marofi, M. (2014). The effects of earmuff on physiologic and motor responses in premature infants admitted in neonatal intensive care unit. *Iranian Journal of Nursing and Midwifery Research, 19*(2), 107–112. http://www.ncbi.nlm.nih.gov/pubmed/24834077%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC4020017

Almadhoob, A., & Ohlsson, A. (2020). Sound reduction management in the neonatal intensive care unit for preterm or very low birth weight infants. *Cochrane Database of Systematic Reviews, 2020*(1). https://doi.org/10.1002/14651858.CD010333.pub3

Altimier, L., Kenner, C., & Damus, K. (2015). Newborn & infant nursing reviews the wee care neuroprotective NICU program (Wee Care): The effect of a comprehensive developmental care training program on seven neuroprotective core measures for family-centered developmental care of premature neonates. *Newborn and infant nursing reviews, 15*(1), 6–16. https://doi.org/10.1053/j.nainr.2015.01.006

Beal, J. (2006). Sound level exposure of high-risk infants in different environmental conditions. *MCN The American Journal of Maternal/Child Nursing, 31*(5), 338. https://doi.org/10.1097/00005721-200609000-00021

Duran, R., Çiftdemir, N. A., Özbek, Ü. V., Berberoğlu, U., Durankuş, F., Süt, N., & Acunaş, B. (2012). The effects of noise reduction by earmuffs on the physiologic and behavioral responses in very low birth weight preterm infants. *International Journal of Pediatric Otorhinolaryngology, 76*(10), 1490–1493. https://doi.org/10.1016/j.ijporl.2012.07.001

Eman A, M. M. (2017). Effect of earplugs on the physiological response of preterm infants during a nebulizer session. 168–178. https://doi.org/10.4103/ENJ.ENJ

Hall, J. W. (1999). Development of the auditory system. *In Ear and Hearing, 20*(1). https://doi.org/10.1097/00003446-199902000-00008

Hassanein, S. M. A., El Raggal, N. M., & Shalaby, A. A. (2013). Neonatal nursery noise: Practice-based learning and improvement. *Journal of Maternal-Fetal and Neonatal Medicine, 26*(4), 392–395. https://doi.org/10.3109/14767058.2012.733759

Joshi, G., & Tada, N. (2017). Effect of noise intensity on vital parameters of newborns in a tertiary care hospital. *Sri Lanka Journalof Child Health, 46*(1), 66–69. https://doi.org/10.4038/sljch.v46i1.8239

Pineda, R. (2015). Erratum: Alterations in brain structure and neurodevelopmental outcome in preterm infants hospitalized in different Neonatal Intensive Care Unit Environments. *Journal of Pediatrics, 166*(4), 1097. https://doi.org/10.1016/j.jpeds.2015.01.022

Polit, D.F., Beck, C. T. (2016). Nursing Research: Appraising evidence for nursing practice (*Issue July*).

Ranganna, R., & Bustani, P. (2011). Reducing noise on the neonatal unit. 7.

Syahreni, E. (2010). Pengaruh pengaturan stimulus sensoris.

Tilly Reid, Y. F. (2001). Neonatal Intensive Care Nursing. *In Journal of Advanced Nursing , 33*(3). https://doi.org/10.1111/j.1365-2648.2001.0442d.x

Utario, Y. (2017). Pengaruh posisi quarter prone terhadap status oksigenisasi bayi prematur yang menggunakan continous positive airway pressure.

Wachman, E. M., & Lahav, A. (2016). The effects of noise on preterm infants in the NICU Article in Archives of Disease in Childhood - Fetal and Neonatal Edition · July 2011 The effects of noise on preterm infants in the NICU. *July 2011*. https://doi.org/10.1136/adc.2009.182014

Analysis of the Satisfaction of Nursing Students towards E-learning of the Medical-Surgical Nursing (MSN) subject during Pandemic

Putu Inge Ruth Suantika*, Yustina Ni Putu Yusniawati

Institute of Technology and Health, Denpasar, Indonesia

Abstract

Background: The whole world is dealing with the covid-19 pandemic. Therefore, the government has taken a policy to transform the education system from in-class to remote learning. Nursing students are adapting to this system, maintaining learning activities through unfamiliar online methods. One of the subjects they take during this pandemic is Medical-Surgical Nursing. This online learning system has created new challenges in the teaching-learning process on the Medical-Surgical Nursing subject. Students tend to feel disinterested, which leads to a sense of dissatisfaction during online learning.
Purpose: This study aimed to analyse the satisfaction of nursing students towards e-learning of the Medical-Surgical Nursing subject during the pandemic.
Methods: This research used descriptive analysis with a cross-sectional research design and used self-administered quiestionnaire. The samples of 300 respondents were nursing students at private and public universities in Denpasar. The research started from January to July 2021 form proposal making to data processing This study used univariate and bivariate analysis involving the logistic regression test.
Results: There is a relationship between the variables of accessibility, understanding the material, interactivity, and method accuracy. The regression equation is -5.336 + 0.011 for Accessibility, + 0.474 for Material, + 0.021 for Interactivity, + 0.150 for Utility, and - 0.093 for Self-Reliance.
Conclusion: The conclusion in this research is that the convenience of obtaining materials is the most significant relationsip.

Keywords: accessibility; learning; nursing education; satisfaction.

Introduction

The coronavirus disease 2019 or better known as COVID-19, has become a pandemic for several months in 2020. Then, the World Health Organization (WHO) declared the COVID-19 a global emergency on March 11th, 2020 (Dilante, 2020). The transmission of this virus is relatively high. It has caused a high percentage of mortality and morbidity in almost all countries, including Indonesia. The Disaster Management Agency reported that as of October 14th, 2020, the COVID-19 cases in Indonesia reached 344,749 patients confirmed as positive, and 12,156 people died (Covid-19 Task Force, 2020). It showed that the virus has been spreading faster and has had a significant impact on human life.

The increasing number of positive confirmed cases of COVID-19 has prompted the Indonesian government to take decisive action to reduce the spread of this disease, such as the large-scale social restrictions and self-isolation. One of the large-scale social restrictions is distance learning methods or online systems in education (Purwanto, 2020). Many countries have implemented this remote learning method, but not yet in Indonesia (Bowers & Kumar, 2015; Porter, Graham, Spring, & Welch, 2014).

The outbreak of Covid-19 has had an impact on the world of education.

OPEN ACCESS

Jurnal Keperawatan Padjadjaran (JKP)

Volume 10(1), 15-21
© The Author(s) 2022
http://dx.doi.org/10.24198/jkp.v10i1.1699

Article Info

Received : August 27, 2021
Revised : January 17, 2022
Accepted : January 24, 2022
Published : April 7, 2022

Corresponding author

Putu Inge Ruth Suantika
Medical Surgical Departement, Faculty of Health, Institute of Technology and Health, Denpasar, Indonesia, postal Code: 80226, Phone: 081805565216, E-mail: ing.nge@gmail.com

Citation

Suantika, P. I.R., & Yusniawati, Y.N.P. (2022). Analysis of The Satisfaction of Nursing Students towards E-Learning of The Medical-Surgical Nursing (MSN) Subject during Pandemic . *Jurnal Keperawatan Padjadjaran, 10*(1), 15-21. http://dx.doi.org/ 10.24198/jkp.v10i1.1699

Website

http://jkp.fkep.unpad.ac.id/index.php/jkp

E-ISSN: 2442-7276
P-ISSN: 2338-5324

It requires enormous changes in the teaching-learning process, including nursing education. It has encouraged the government and universities to make innovations in the teaching-learning process through online learning methods. As a result, students need to spend time studying from home. Several nursing students expressed difficulties in the teaching-learning process because medical surgical nursing subject areas required a good understanding to support their knowledge and skills. Due to changes in learning during the pandemic, it is not uncommon for students to experience depression, anxiety and stress ranging from mild to severe symptoms (Acob, Arifin & Dewi, 2021)

Based on the AIPNI (Asosiasi Institusi Pendidikan Ners Indonesia) curriculum, the semester credit system in medical-surgical nursing holds the most credits compared to other subjects (Core Curriculum for Indonesian Nurses Education, 2015). In the nursing profession curriculum, medical-surgical nursing is also the subject with the most credits in clinical practice. It requires students to learn more about the medical-surgical nursing subject both in theory and skills. In this current pandemic, it becomes a new challenge for lecturers and students. Based on researcher interviews, students' opinions reflected dissatisfaction towards the online process in this subject because of the subject complexity, limited learning time, and the absence of opportunities to meet directly with lecturers. .

The authors realize that the students' satisfaction level towards online learning in medical-surgical nursing subject is still relatively low. Therefore, it is necessary to conduct further study on the factors related to the students' satisfaction level towards e-learning in this subject, so that student satisfaction with the online learning process will have an impact on student learning outcomes which include knowledge and skills improvement. This study aimed to analyse the satisfaction of nursing students towards e-learning of the Medical-Surgical Nursing subject during the pandemic.

Methods

A Study Design

This quantitative research uses descriptive analysis with a cross-sectional research design. The independent variables in this study are accessibility, the convenience of understanding the materials, interactivity, method accuracy, and self-reliance. Then, the dependent variable is student satisfaction.

Setting

This research started from January to July 2021 for seven months long. Nursing students from private universities in Denpasar took part to be the respondents.

Research Subject

The population in this study were all students of grade 4 and 6 from public and private universities in Denpasar which included ITEKES Bali, Stikes Wira Medika Denpasar, Udayana University, and Poltekkes Denpasar. The authors used a purposive sampling technique with the Slovin formula and obtained 300 respondents. Inclusion criteria were nursing students who had taken medical-surgical nursing subject online. Exclusion criteria were respondents who refused to be research subjects, did not complete the questionnaire, and students who were on leave were not included in the study.

Instruments

This study used several questionnaires developed by researchers according to the topic and quoted from several studies in Indonesian. The questionnaires included seven parts. First, the characteristic questionnaire consisted of initials, age, gender, university origin, learning media used, internet network conditions, study locations, and devices used during learning. Second, the accessibility of the e-learning questionnaire contained seven statements using a Likert scale with reliability alpha Cronbach 0.781. Then, the four statements of convenience of obtaining materials inquiry had alpha Cronbach score of 0.876. Interactivity questionnaire with nine statements had a Cronbach alpha of 0.887. Utility questionnaire with six statements had a Cronbach alpha of 0.928. The self-reliance questionnaire had 12 points with a Cronbach alpha of 0.911. Lastly, the satisfaction questionnaire with five statements had a Cronbach alpha of 0.864.

The independent variables including accessibility, convenience of obtaining materials, interactivity, utility, and self-reliance have three categories: good, sufficient, and poor. The values are categorized based on the quartile values. While the dependent variable of satisfaction has two classifications: satisfied and dissatisfied based on the median value. The researcher modifies the questionnaire according to the needs and then tested the reliability and validity. The authors developed the questionnaires from previous research with a Likert scale regarding factors related to students' satisfaction (Cigdem & Ozturk (2016), Kuo, et al. (2014), Liaw & Huang (2016).

Data Analysis

The univariate analysis is to identify each research variable, including demographic data, accessibility, the convenience of understanding the materials, interactivity, methods accuracy, self-reliance, and the students' satisfaction level towards e-learning. Then, the bivariate analysis aims to determine factors related to students' satisfaction towards e-learning in the medical-surgical nursing subject.

The statistical test used is the chi-square test if it meets the requirements. Then, by using the SPSS test for windows version 20, with a 95% confidence interval or p-value smaller than 5% alpha (<0.05), Ho is rejected with a 95% CI value.

The multivariate analysis by logistic regression aimed to determine the variables that have a more

Table 1. Respondents Characteristics

Variables			Students' Satisfaction				P
			Dissatisfied		Satisfied		
	n	%	n	%	n	%	
Age							
19 years old	28	9.3					
20 years old	112	37.3					
21 years old	125	41.7					
22 years old	31	10.3					
23 years old	2	0.7					
24 years old	2	0.7					
Gender							
Male	36	12.0					
Female	264	88.0					
University Origin							
Utekes Bali	175	58.3					
Stikes Wira Medika	34	11.3					
PSSKPN Udayana	75	25.0					
Poltekkes Denpasar	16	5.3					
Network Conditions							
Poor	9	3.0					
Fair	225	75.0					
Good	66	22.0					
Study Locations							
Home	284	94.7					
Boarding house	16	5.3					
Electronic Devices							
Handphone	161	53.7					
Computer	139	46.3					
Accessibility							
Poor	110	36.7	52	47.30	58	30.50	0.000
Sufficient	98	32.7	39	35.50	59	31.10	
Good	92	30.7	19	17.30	73	38.40	
Materials Understanding							
Complex	46	15.3	37	33.60	9	4.70	0.000
Fair	164	54.7	63	57.30	101	53.20	
Easy	90	30.0	10	9.10	80	42.10	
Interactivity							
Passive	84	28.0	43	39.10	41	21.60	0.001
Sufficient	126	42.0	46	41.80	80	42.10	
Active	90	30.0	21	19.10	69	36.30	
Utility							
Poor	80	26.7	43	39.10	37	19.50	0.000
Sufficient	185	61.7	63	57.30	122	62.20	
Appropriate	35	11.7	4	3.60	31	16.30	

Variables	Students' Satisfaction						p
			Dissatisfied		Satisfied		
	n	%	n	%	n	%	
Self-Reliance							
Less	79	26.3	30	27.30	49	25.80	0.341
Fair	141	47.0	56	50.90	85	44.70	
Independent	80	26.7	24	21.80	56	29.50	
Satisfaction							
Dissatisfied	110	36.7					
Satisfied	190	63.3					

Table 2. The Logistic Regression Equation

Variable	Coefficient β	SE (B)	p-value	OR (Minimum-Maximum)
Accessibility	0.011	0.057	0.852	1.011 (0.904-1.130)
Materials understanding	0.474	0.091	0.000	1.6060 (1.343-1.919)
Interactivity	0.021	0.045	0.651	1.021 (0.934-1.116)
Utility	0.150	0.056	0.008	1.161 (1.040-1.297)
Self-reliance	-0.093	0.036	0.010	0.911 (0.849-0.978)
Constant	-5.336	1.600	0.001	

significant influence on other variables. Logistic regression analysis is a mathematical approach used to analyse the relationship between several independent variables and a dichotomous or binary dependent variable. The authors applied the analysis in this research, considering that the dependent variables are satisfied and dissatisfied.

Ethical Consideration

Prior to data collection, the Ethics Committee of Institute Technology and Health Bali approved this study on June 28th, 2021, with approval number: 04.0466/KEPITEKES-BALI/VI/2021. The authors confirmed that all respondents had obtained appropriate informed consent.

Results

Based on the table 1 above, demographic data is presented. Out of 300 respondents, 125 respondents were 21 years old, then 112 respondents were 20 years of age. Most of the respondents, namely 264 people were female, while 36 respondents were male. The data shows that 175 respondents came from ITEKES Bali, 75 students came from PSSKPN Udayana, 34 respondents came from Stikes Wira Medika, and 16 respondents came from Poltekkes Denpasar. On the network conditions aspect, 225 respondents considered it as fair. Then, 66 respondents revealed it as good, while nine others implied it as poor. Only 16 respondents studied at the boarding house while 284 students studied from home. Handphone was the most widely used device as 161 respondents chose it, although 139 students used laptops.

The results showed that 110 respondents remarked poor on the accessibility aspect, 98 students considered it sufficient, and 92 people experienced the good ones. On the materials understanding variable, 46 students thought it was complex, 164 respondents answered it was fair, and 90 students revealed it was easy. For the interactivity variable, 126 people stated it as sufficient, as 90 students claimed they could actively interact, while 84 respondents chose the passive category. Considering the method used during the online learning process, 185 people marked it as sufficient, then 35 people stated it as appropriate, whereas 80 people responded to the poor category. For the self-reliance aspect, 141 people counted it as fair, 80 students answered they were independent in learning, yet 79 respondents claimed they were less. Concerning the satisfaction variable, 190 respondents conveyed they were satisfied, while 110 people were dissatisfied.

Based on chi-square cross tabulation, the results show that there is a significant relationship between satisfaction and most all of the variables: accessibility (p value = 0.000 and X2 = 15.902), the convenience of obtaining materials (p value = 0.000 and X2 = 63,473), interactivity (p value = 0.000 and X2 = 15.522). The data shows there is a relationship between satisfaction with the method accuracy (p value = 0.000 and X2 = 20.198). Meanwhile, the self-reliance variable has no significant relationship with the satisfaction variable (p value = 0.341 and X2 = 2.154).

The logistic regression equation in the table can

be written with the model (y = a (constant) + b1x1 + b2x2x), which is -5.336 + 0.011 Accessibility + 0.474 Material + 0.021 Interactivity + 0.150 Utility - 0.093 Self-Reliance. The table above shows that:

1. The odds ratio for the Accessibility variable is 1.011. The coefficient B is positive, and the data is quantitative, therefore if the Accessibility variable increases by 1 unit, the probability ratio of Satisfied compared to Dissatisfied will increase by a factor of 1.011, assuming the variables of Material, Interactivity, Utility, and Self-reliance are constant.
2. The odds ratio for Material is 1.606. The coefficient B is positive, and the data is quantitative, thus if the material increases by 1 unit, the probability ratio of Satisfied compared to Dissatisfied will increase by a factor of 1.606, assuming the variables Accessibility, Interactivity, Utility, and Self-Reliance are constant.
3. The odds ratio for Interactivity is 1.021. The coefficient B is positive, and the data is quantitative, thus if the interactivity increases by 1 unit, the probability ratio of Satisfied compared to Dissatisfied will increase by a factor of 1.021, assuming the variables of Accessibility, Material, Utility, and Self-Reliance are constant.
4. The odds ratio for the Utility variable is 1.161. The coefficient B is positive, and the data is quantitative, therefore if the utility variable increases by 1 unit, the probability ratio of Satisfied compared to Dissatisfied will increase by a factor of 1.161, assuming the variables of Accessibility, Material, Interactivity, and Self-reliance are constant.
5. The odds ratio for the Self-Reliance variable is 0.911. The coefficient B is negative, and the data is quantitative, therefore if the self-reliance increases by 1 unit, the probability ratio of Satisfied compared to Dissatisfied will decrease by a factor of 0.911, assuming the variables of Accessibility, Material, Interactivity, and Utility are constant.

Discussion

The COVID-19 pandemic has changed the pattern of life for the entire community from all aspects, including education. The droplet transmission of COVID-19 has urged society to keep their distance and avoid direct contact while interacting. It has affected the education system to transform the in-class into remote learning that utilises technology as a way of learning.

Online learning is uncommon in the education system in Indonesia, so adaptation is needed. Higher education settings can adapt more quickly to online learning since they are more familiar with the technology. The nursing education system has started to use technology as a tool in continuing online learning. The lecturers use various methods during the learning process to make effective and efficient lessons for the students. For this reason, it is necessary to support the facilities, infrastructure, activeness and creativity of the lecturers.

Students' perceptions influence their satisfaction towards e-learning, involving the activeness, the convenience of accessing materials, internet connection, teaching methods, and motivation to study. Alquarshi (2019) stated that the factors related to satisfaction and perception in distance learning are self-efficacy, materials understanding, and the interaction between students and lecturers. Self-efficacy gives higher satisfaction because it encompasses the responses towards learning evaluation, a good comprehension of the materials, getting challenges in the learning process, and increasing involvement.

This study shows that the accessibility, the convenience of understanding the materials, interactivity, method accuracy variables have a significant relationship with students' satisfaction. However, the self-reliance variable does not. One of the necessary tools during online learning is accessibility, including the internet network to obtain the lessons. The respondents in this study stated they got sufficient internet connection, yet most experienced a poor network. Almost in all over Bali Island, including Denpasar, the internet connection is unstable due to the scattered learning locations. Few students returned to their home areas where internet access could be lacking. Moreover, some of them did not understand how to operate the computer, which hindered them in accessing materials or attending online lectures. Yilmaz (2017) states that when individuals are technology savvy, it will increase motivation during learning.

Another indicator that affects students' satisfaction during online learning is the convenience of understanding the materials. Medical-surgical nursing materials are very complex, so this subject requires students to discover more related literature. The respondents in this study are interested in learning about medical-surgical nursing materials. It motivates the students to brainstorm the concepts before the class begins. The lecturers provide easy access to the lessons for students. Although they might face difficulties understanding the subject, the students put individual efforts to figure out the medical-surgical nursing materials. Research by Rachmawati and Putri (2020) reveals that students find it hard to understand the lessons through online learning because they are accustomed to face-to-face learning. In-class lectures allow students to interact easily. When students experience difficulties, they can ask the lecturer immediately. However, the students can take advantage of online learning. The students can access the lessons anytime, anywhere that will trigger the preparations before online learning starts. Online learning that uses educational videos containing material explanations from lecturers is said to have a good effect in increasing student knowledge, also accompanied by assignments to hone their skills (Rahayu, Sulistiyawati, Purnamasari, Sawitri & Fikriah, 2021).

The interactivity between students and lecturers indicates the success of the learning process. In distance learning, students frequently feel detached

from the lecturers due to various obstacles. It might cause the students to feel uninterested in the learning process, which leads to confusion in understanding the materials (Rachman, 2012). Ineffective communication often occurs due to several obstacles, such as an unstable internet connection. Furthermore, the complex materials prompt the students to be focused. Eventually, it will lead to a reluctance for students to interact during the lesson. Demir (2015) states that online-based communication will be effective where individuals interact remotely with a language that is easy to understand, have a language culture and a supportive environment. Yilmaz's research (2017) found that interactions among students, other students, and teachers are effective during online learning. Good interaction also shows increased learning needs that will address satisfaction and motivation to learn (Yilmaz, 2014).

The effectiveness of the distance learning method influences students' satisfaction. The use of the appropriate approach can increase the knowledge and skills of students (Nurumal, Diyono & Che, 2020). It will affect the system, information, and services qualities received by students (Pawirosumarto, 2016). Liaw and Huang (2013) found that one of the interactive learning environments is determined by appropriate learning media. The videos in the LMS as learning media are accessible at any place and anytime (Karao_glan Yilmaz & Keser, 2016). The learning methods design will arouse curiosity and attract the attention to learn and understand the lessons. The high curiosity about the materials will encourage the students to interact with each other through online learning. It will also be one of the pedagogical learning for applying the technology method as an adult learning that improves the learning outcomes (Yılmaz & Kılıç-Çakmak, 2012).

This study shows that the self-reliance factor is not related to students' satisfaction. It is different from the research by Yilmaz (2017), which states that independence in the learning process is one of the factors that affect students' satisfaction. Distance learning makes students less independent because they are not familiar with online methods in the learning process. However, some students feel they are required to increase their independence in learning. Yilmaz (2017) shows that e-learning readiness is a crucial predictor of students' satisfaction and learning motivation. Therefore, to build learning satisfaction, determine the readiness of students. Lecturers can help them by providing learning materials and topics discussion the day before the online learning schedule. If there are students who have low readiness, it is the lecturer's responsibility to assist them in arranging the strategy during the online learning. Moreover, to improve online learning readiness, it is also necessary to update the curriculum or improve computer-based and technology-based learning. Lecturers must become role models for students in using e-learning methods (Hao and Lee, 2016).

Conclusion

The conclusion of this research is that there are some variables which have relationship with student's satisfaction such as accessibility, convenience in understanding materials, interactivity, method accuracy. The most significant relationship is the convenience of obtaining materials with an OR value of 1.606.

References

Acob, Joel Rey U, Arifin, Hidayat & Dewi, Yulis Setiya. (2021). Depression, anxiety and stress among students amidst COVID-19 pandemic: A Cross-Sectional Study in Philippines. *Jurnal Keperawatan Padjadjaran (JKP), 9*(2), 103-110. http://dx.doi.org/10.24198/jkp.v9i2.1673

Alqurashi, Emtinan. (2019). Predicting student satification and perceived learning within online learning environments. *Distance Education, 40*(1), 133-148. https://doi.org/10.1080/01587919.2018.1553562

Bowers, J., & Kumar, P. (2015). Students' perceptions of teaching and social presence: A comparative analysis of face-to-face and online learning environments. *International Journal of Web-Based Learning and Teaching Technologies, 10*(1), 27–44. https://doi.org/10.4018/ijwltt.2015010103

Cigdem., Harun & Ozturk, Mustafa. (2016). Factors affecting students' behavioral intention to use LMS at a Turkish post-secondary vocational school. *International Review of Research in Open and Distributed Learning, 17*(3), 275-295 . https://doi.org/10.19173/irrodl.v17i3.2253

Core Curriculum for Indonesian Nurses Education. (2015). *Association of Indonesian nurses education institutions.* ISBN: 978-602-19251-5-7

COVID-19 Task Force. (2020). National board for disaster management. https://loker.bnpb.go.id/s/GugusTugasCovid19?path=%2FData%20Kemenkes%2FHasil#pdfviewer

Demir, O. (2015). The investigation of e-learning readiness of students and faculty members: Hacettepe unıversity faculty of education example. Master Thesis. Ankara: Hacettepe University.

Djlante, R., Lassa, J., Setiamarga, D., Sudjatma, A., Indrawan, M., Haryanto, B.,et al. (2020) Review and analysis of current responses To Covid-19 in Indonesia: Period of Januari until March 2020. *Progress In Disaster Science, 6*:1-9. https://doi.org/10.1016/j.pdisas.2020.100091

Hao, Y., & Lee, K. S. (2016). Teaching in flipped classrooms: Exploring pre-service teachers' concerns. *Computers in Human Behavior, 57*, 250-260. https://doi.org/10.1016/j.

chb.2015.12.022

Karao, glan, Yilmaz, F. G., & Keser, H. (2016). The impact of reflective thinking activities in e-learning: A critical review of the empirical research. *Computers & Education, 95,* 163-173. https://doi.org/10.1016/j.compedu.2016.01.006

Kuo, Yu-Chun., Walker, Andrew E., Schroder, Kerstin E.E., Belland, Brian R. (2014). Interaction, internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses. *Internet and Higher Education, 20*, 35–50. https://doi.org/10.1016/j.iheduc.2013.10.001

Liaw, S. S., & Huang, H. M. (2013). Perceived satisfaction, perceived usefulness and interactive learning environments as predictors to self-regulation in e-learning environments. *Computers & Education, 60*(1), 14-24. https://doi.org/10.1016/j.compedu.2012.07.015

Nurumal, M. S., Diyono, N., & Che Hasan, M. K. (2020). Self-efficacy levels regarding interprofessional learning skills among undergraduate healthcare students in Malaysia. *Sultan Qaboos University Medical Journal, 20*(4), e374–e379. https://doi.org/10.18295/squmj.2020.20.04.015

Pawirosumarto, S. (2016). Pengaruh kualitas sistem, kualitas informasi, dan kulaitas layanan terhadap kepuasan penggunaan sistem e-learning. *Jurnal Ilmiah Manajemen, 6*(3), 416-433.

Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education, 75,* 185–195. https://doi.org/10.1016/j.compedu.2014.02.011

Purwanto, A., Pramono, R., Asbari, M., Santoso, P.B., Wijayanti, L.M., Yun, C.C.,el al. (2020). Studi eksploratif dampak pandemi COVID-19 terhadap proses pembelajaran online di Sekolah Dasar. *Edupsycouns Journal (Journal Of Education, Psychology And Counseling, 2,* 1-12. https://ummaspul.e-journal.id/Edupsycouns/article/view/397

Rachman, M.M. (2012). Pengaruh kemampuan intelektual, pembelajaran individual dan internal locus of control terhadap kompetensi dan kinerja dosen. *Jurnal Ekonomi dan Bisnis Airlangga (JEBA), 22*(1), 91-105

Rahayu, Anik Puji., Sulistiyawati,. Purnamasari Cicih Bhakti, Sawitri Endang, & Fikriah Ika. (2021). Analysis The Student Perception of Application Clinical Skills Online Learning in The Pandemic Time Covid-19. *Jurnal Keperawatan Padjadjaran, 9*(2): 97-102. https://doi.org/10.24198/jkp.v9i2.1600

Rachmatwati & Putri, Evita MuslimaIsnanda. (2020). Learning from home dalam perspektif persepsi mahasiswa era pandemi COVID-19. *Prosiding Seminar Nasional Hardiknas*.

Yılmaz, R. (2014). The effect of interaction environment and metacognitive guidance in online learning on academic success, metacognitive awareness and transactional distance. Doctoral Dissertation. Ankara: Ankara University.

Yılmaz, R., & Kılıç-Çakmak, E. (2012). Educational interface agents as social models to influence learner achievement, attitude and retention of learning. *Computers & Education, 59*(2), 828-838. https://doi.org/10.1016/j.compedu.2012.03.020

Yilmaz, Ramazan (2017). Exploring the role of e-learning readiness on student satisfaction and motivation in flipped classroom. *Computers in Human Behavior, 70*(2017), 251–260. http://dx.doi.org/10.1016/j.chb.2016.12.085