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THE EFFECT OF ORAL MOTOR EXERCISE AND SEMANTIC DIVERGENCE ON IMPROVING SPEAKING ABILITY OF STROKE PATIENTS

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ABSTRACT

Non-communicable diseases have shown a changing trend, marked by a continuous increase in morbidity and mortality rates, with stroke being one of the leading causes. Among stroke patients, approximately 21% to 38% experience aphasia, a disorder that affects communication skills, particularly in understanding and expressing language. Effective rehabilitation is crucial to restoring these functions. Two non-pharmacological interventions, Oral Motor Exercise and Semantic Divergent Therapy, have been recognized for their potential to enhance speech ability in stroke survivors. This study aimed to determine the effect of combining Oral Motor Exercise and Semantic Divergent Therapy on improving speech ability in stroke patients. A quasi-experimental design with a pretest-posttest control group approach was used, involving 40 participants selected through purposive sampling. The intervention group received both therapies, while the control group underwent AIUEO therapy. Results showed that the mean speech score of the intervention group increased from 15.40 to 20.85, while the control group's score rose from 15.30 to 19.45. The Independent T-test analysis revealed a p-value of 0.000 ($p < 0.05$), indicating a significant difference between groups. These findings demonstrate that Oral Motor Exercise combined with Semantic Divergent Therapy effectively enhances speech ability in stroke patients. Therefore, this combined approach is recommended as an effective non-pharmacological rehabilitation intervention to support recovery and improve communication functions after stroke.

Keywords: Aphasia; Oral Motor Exercise; Semantic Divergent; Stroke

INTRODUCTION

Non-communicable diseases (NCDs) are chronic illnesses that are not transmitted from one person to another or from animals to humans. NCDs develop gradually without apparent early symptoms and are a significant cause of global mortality (Musfidah Nisfil, 2024). According to the World Health Organization (WHO), the three most prevalent NCDs are coronary heart disease, stroke, and diabetes mellitus (Seli & Harahap, 2021).

A stroke is a neurological disorder caused by an interruption of blood supply to the brain, either due to a blockage (*ischemic stroke*) or the rupture of blood vessels (*hemorrhagic stroke*), leading to neuronal death, disability, or sudden death (Robert Daniel & Ni Luh Jayanthi, 2023). WHO (2023) reported that stroke is the second leading cause of death worldwide, accounting for 11% of global morbidity and 16% of total deaths. The World Stroke Organization (WSO, 2022) also stated that there are more than 101 million stroke survivors globally, with 12.2 million new cases each year.

In Indonesia, the prevalence of stroke increased to 8.3 per 1,000 population in 2023, with 638,178 recorded cases, including 4,687 in Bengkulu Province. The total number of national stroke cases is projected to reach 23.3 million by 2030 (Kemenkes, 2023). The clinical impact of stroke varies depending on the location

and size of the affected brain area. When the middle cerebral artery is involved, patients are at risk of developing aphasia, a language disorder resulting from damage to Broca's and Wernicke's areas in the left cerebral hemisphere (Siregar, 2021).

Aphasia affects a person's ability to speak, understand language, read, and write, with significant consequences for social and psychological functioning. Individuals with aphasia often experience loss of self-confidence, communication difficulties, and a higher risk of depression (Nasrullah *et al*., 2020). One effective rehabilitative intervention is *Oral Motor Exercise* (OME), which involves movements of the oral cavity muscles, such as the tongue, lips, jaw, and palate, to improve speech function (Budiarti *et al.*, 2022). Research by Aryanti & Masfuri (2023) demonstrated that daily OME training, conducted over six days with ten minutes per session, significantly improved swallowing function in stroke patients, as indicated by increased RAPIDS scores.

In addition to OME, the *Semantic Divergent* method has also been shown to be effective in enhancing communication skills in patients with aphasia. This approach utilizes words, pictures, and gestures to enhance the semantic network and language comprehension (Djuhendi & Popon, 2021). A study by Novalia Naluri Tasari & Muryanti (2023) demonstrated that the *Semantic Divergent* method significantly increased expressive language ability in patients with fluent aphasia ($p < 0.05$).

Both therapies, OME and *Semantic Divergent*, complement each other: OME strengthens the physiological aspects of speech, while *Semantic Divergent* enhances linguistic and cognitive components. Combining these two therapies is expected to produce a more comprehensive improvement in speech ability compared to using a single method.

According to data from the Bengkulu City Health Office (2023), Sawah Lebar Public Health Center recorded the highest stroke prevalence, with 54 cases. Preliminary observations indicated that most stroke patients with aphasia in this area had not received adequate information or intervention regarding OME and *Semantic Divergent* therapy.

Based on this background, this study aims to determine the effect of combining *Oral Motor Exercise* and *Semantic Divergent* therapy on improving speech ability in stroke patients with aphasia in the working area of Sawah Lebar Public Health Center, Bengkulu City, in 2025.

MATERIALS AND METHODS

A quasi-experimental design with a pretest-posttest control group was employed to compare two groups before and after the intervention. The intervention group received Oral Motor Exercise combined with Semantic Divergent Therapy, while the control group underwent AIUEO therapy. Both groups participated in eight 15-minute sessions.

Participants were purposively selected from stroke patients with mild to moderate aphasia within the Sawah Lebar Public Health Center area. Inclusion criteria included willingness to provide informed consent, adequate auditory and visual function, and the presence of family support during therapy.

Data collection involved assessing speech ability before and after the intervention using the Derby Scale (0–8) to measure improvement in verbal communication.

Data analysis was conducted by comparing pretest and posttest scores between the intervention and control groups to determine the effectiveness of the applied therapies. This study received ethical clearance from the Ethics Committee of Poltekkes Kemenkes Bengkulu under approval number KEPK.BKL/096/02/2025.

RESULTS AND DISCUSSION

A. Univariate analysis

1. Respondent Characteristics

Table 1 Distribution of Respondents' Characteristics by Age, Gender, Education Level, Type of Stroke, and Frequency of Stroke Attacks.

NO	Variable	Group		*pValue*
		Intervention (n=30)	**Control (n=30)**	
1	**Age**			
	Mean	59.80	61,77	0,429***
	Min	46	54	
	Max	75	80	

	SD	8,019	9.220	
	SE	1.464	1,683	
2	**Gender**			
	Male	23 (76,7%)	22 (73,3%)	0,766*
	Female	7 (23,3%)	8 (26,7%)	
3	**Education Level**			
	SD	22 (73,3%)	17 (56,7%)	
	SMP	2 (6,7%)	5 (16,7%)	0,280*
	SMA	5 (16,7%)	4 (13,3%)	
	PT	1 (3,3%)	4 (13,3%)	
4	**Type of Stroke**			
	Hemoragic	9 (30%)	7 (23,3%)	0,771*
	Non-Hemorrhagic	21 (70%)	23 (76,7%)	
5	**Frequency of Stroke Attacks**			
	More than twice	6 (20%)	9 (30%)	
	Second	9 (30%)	10 (33,3%)	0,407*
	First	15 (50%)	11 (36,7%)	

****** Man-Whitney Test *chi-square***

Based on Table 1, the average age of respondents in the intervention group was 59.80 years (SD = 8.019; CI = 56.81–62.79). Most were male (76.7%), had a non-hemorrhagic stroke (70%), experienced their first stroke (50%), and had an elementary school education (73.3%). In the control group, the average age was 61.77 years (SD = 9.220; CI = 58.32–65.21), with the majority being male (73.3%) and having a non-hemorrhagic stroke (76.7%). Nearly half experienced their first stroke (36.7%), and more than half had an elementary school education (56.7%).

All baseline variables (age, gender, education, stroke type, and stroke frequency) showed p-values > 0.05, confirming normal distribution and homogeneity between groups.

2. Description of Speech Ability Before and After Intervention in the Intervention and Control Groups

Table 2 Description of Speech Ability Before and After Oral Motor Exercise and Semantic Divergent Therapy Among Stroke Patients

Variable	N	Mean	Min-Max	SD	CI For Mean 95%
Before intervention					
Intervention	30	**15,40**	**11-20**	**2,927**	**14,03-16,77**
Control	30	**15,30**	**11-20**	**2,830**	**13,98-16,62**
After intervention					
Intervention	30	**20,85**	**15-26**	**3,249**	**19,33-22,37**
Control	30	**19,45**	**13-24**	**3,236**	**17,94-20,96**

*****Deskriptif Statistik***

Table 2 presents data indicating that the intervention group's average speech score was 15.40 (SD = 2.93; CI = 14.03–16.77) before the therapy and rose to 20.85 (SD = 3.25; CI = 19.33–22.37) afterward, showing a 5.45-point improvement. In comparison, the control group's mean score increased from 15.30 (SD = 2.83; CI = 13.98–16.62) to 19.45 (SD = 3.24; CI = 17.94–20.96), reflecting a gain of 4.15 points in speech ability.

B. Bivariate Analysis

The Shapiro-Wilk normality test showed that the data within each group were normally distributed ($p > 0.05$); therefore, a *Paired T-Test* was used. However, the data between groups were not normally distributed ($p < 0.05$), so the *Mann-Whitney* test was used to examine the effect of the therapy.

1. Normality and Homogeneity Tests

The normality test showed that the variables had a normal distribution, and the homogeneity test indicated equal variances. Therefore, parametric tests were used for further analysis if needed.

2. Mean Differences in Speech Ability Before and After Treatment in the Intervention and Control Groups

Table 3
Differences in Mean Speech Ability Before and After Treatment in The Intervention and Control Groups

	n	Mean ± SD	Difference in Mean ± SD	t	CI 95%	*P value*
Intervention Group Speech Score						
Before	30	15.40±2.927	-1.750 ±2.173	-3.601	-2.767 s/d - 733	0.000**
After	30	17.15±3.573				
Control Group Speech Score						
Before	30	15.30±2.830	-1.500±0.761	-8.816	-1.856 s/d -1.144	0.000**
After	30	16.80±3.270				

***Paired T Test*

Table 3 shows that the Paired t-test yielded a p-value of 0.000, which is less than the significance level (α = 0.05), indicating a meaningful improvement in average speech ability in the intervention group after treatment. A similar result was found in the control group, where the p-value of 0.000 also suggests a statistically significant change in speech ability following the intervention.

3. The Effect of Oral Motor Exercise and Semantic Divergent Therapy on Improving Speech Ability in Stroke Patients at Sawah Lebar Public Health Center, Bengkulu City

Table 4
The Effect of Oral Motor Exercise and Semantic Divergent Therapy on Improving Speech Ability in Stroke Patients

	N	Mean±SD	Mean Difference (CI 95%)	t	P
Verbal Communication Skill					
Difference	60	1.300±0.330	0.631s/d1.969	3.934	0.000****

**** * Independent Samples t-test*

Table 4 shows a p-value of 0.000 ($p \leq 0.05$), indicating a statistically significant difference in speech ability between the intervention and control groups. This suggests that Oral Motor Exercise and Semantic Divergent Therapy effectively improve speech in stroke patients.

CONCLUSION

1. Respondent Characteristics Overview

a. Age

The average age of respondents in this study was over 50 years, with the intervention group averaging 59.80 years and the control group averaging 61.77 years. This indicates that stroke commonly occurs in middle-aged individuals. This finding is consistent with the study by Anggraini *et al*. (2024), which reported that the majority of ischemic stroke patients were between 46 and 66 years old. After age 45, organ function tends to decline, and vascular elasticity decreases, particularly when accompanied by comorbidities such as hypertension, heart disease, or diabetes, or by genetic factors, all of which can increase the risk of impaired cerebral blood flow and potential rupture of blood vessels.

b. Gender

Most participants were male, accounting for 76.7% in the intervention group and 73.3% in the control group. This finding aligns with previous studies, including Lumintang (2024), which reported 57.5% male respondents; Sesep *et al*. (2024), which reported 54.5%; and Koto & Hidayatullah (2025), which reported 63.3%. One contributing factor is the influence of testosterone, which can elevate LDL levels and thereby increase the risk of stroke. Additionally, smoking habits, which are more prevalent among men, also contribute to this risk. Field observations revealed that nearly all male respondents had a history of smoking, reinforcing the link between biological and lifestyle factors in the incidence of stroke among men.

c. Education

Regarding educational background, most individuals in the intervention group had completed only elementary school (73.3%), and a similar pattern was observed in the control group (56.7%). This finding is consistent with those of Anggraini *et al*. (2024), who reported that 49 of 65 respondents (75.4%) had an elementary school education. These results indicate that most respondents had low

levels of education. Although there is no direct correlation between stroke and education level, higher education may influence an individual's awareness and perception of disease and health.

d. Type of Stroke

This study found that most respondents in the intervention group experienced non-hemorrhagic stroke, while nearly half of the control group also had the same type of stroke. This is in line with the findings of Geneva & Usman (2023), who reported that 61.1% of respondents suffered from non-hemorrhagic stroke, and Halimatunnisa *et al*. (2023), who recorded 70.9% of non-hemorrhagic and 29.1% of hemorrhagic cases. This type of stroke is often associated with aging, as declining bodily functions may lead to plaque buildup in blood vessels, obstructing oxygen flow to the brain and increasing the risk of ischemic stroke.

e. Frequency of Attacks

Most respondents in both the intervention and control groups experienced stroke for the first time. This finding is consistent with previous studies by Rahmawati (2023), Virdiyanti *et al*. (2024), and Koto & Hidayatullah (2025), all of which reported a predominance of first-time stroke cases. Mohammed *et al*. (2025) also noted that most stroke incidents were first-ever strokes, indicating that the individuals had no prior history of stroke. These findings underscore the importance of primary prevention through risk factor control and the need to enhance public education to promote early recognition of stroke symptoms.

2. **The Effect of Oral Motor Exercise and Semantic Divergent Therapy on Improving Speech Ability in Stroke Patients**

The results of the independent T test indicated a significant effect of Oral Motor Exercise and Semantic Divergent Therapy on the improvement of speech ability in stroke patients in the working area of Puskesmas Sawah Lebar in 2025 ($p = 0.000 \leq \alpha = 0.05$).

The findings of this study are consistent with previous research, which demonstrates the effectiveness of Oral Motor Exercise and Semantic Divergent therapy in improving speech ability among stroke patients. Anjelina *et al*. (2024) reported a significant difference in aspiration scores between the intervention and control groups ($p = 0.000$), indicating that Oral Motor Exercise positively influences aspiration in stroke patients. Similarly, Hägglund *et al*. (2020)found that a five-week oral neuromuscular training program significantly improved swallowing function in post-stroke dysphagia patients ($p < 0.001$).

Freire *et al*. (2020) also observed a statistically significant improvement in verbal fluency among non-fluent aphasic patients after speech therapy intervention ($p < 0.001$). Novalia Naluri Tasari & Muryanti (2023) demonstrated that the Semantic Divergent method effectively enhanced expressive language skills in patients with fluent aphasia ($p = 0.000$). Kristinsson *et al*. (2021) further revealed that semantic treatment yielded greater improvement in naming performance among patients with chronic post-stroke aphasia compared to phonological treatment ($p < 0.005$).

In addition, Abtari *et al*. (2024) reported that memory therapy significantly improved cognitive abilities in non-hemorrhagic stroke patients ($p = 0.000$), and Koto & Hidayatullah (2025) found that "AIUEO" speech therapy effectively enhanced speech ability in motor aphasia patients ($p < 0.001$).

Oral motor exercises stimulate sensory input and strengthen facial, oral, and pharyngeal muscles to support sound production. At the same time, Semantic Divergent therapy focuses on language processing and vocabulary expansion through semantic association tasks. The success of these therapies is influenced by patient motivation and family involvement throughout the treatment process. Based on these findings and supporting studies, the combination of Oral Motor Exercise and Semantic Divergent therapy has a significant positive effect on improving speech ability in stroke patients.

CONFLICT OF INTEREST

The authors declare that there are no financial conflicts of interest related to the research, authorship, and/or publication of this article entitled *"The Effect of Oral Motor Exercise and Semantic Divergent Therapy on Speech Ability of Stroke Patients."*This statement is submitted by the corresponding author on behalf of all authors of the manuscript.

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REFERENCES

Abtari, M. D., Amita, D., & Ayu Ningsih, S. (2024). Pengaruh Terapi Memori Terhadap Kemampuan Kognitif Pada Pasien Stroke Non Hemoragik Di Rsud Kabupaten Empa Lawang. *Journal Of Public Health Science*, *1*(1), 60–68. Https://Doi.Org/10.59407/Jophs.V1i1.601

Anggraini, A., Pudiarifanti, N., & Muslim, Z. (2024). Gambaran Penggunaan Obat Pada Pasien Stroke Iskemik Di Rsud. Dr. M. Yunus Kota Bengkulu Tahun 2022. *Journal Pharmacopoeia*, *3*(1), 44–54. Https://Doi.Org/10.33088/Jp.V3i1.481

Anjelina, B., Efendi, P., Pardosi, S., Ratnadhiyani, A., Bengkulu, K., Bengkulu, P. K., Indragiri, J., Harapan, P., Harapan, P., Cempaka, K. G., & Bengkulu, K. (2024). *Pengaruh Oral Motor Excerise Terhadap Kejadian Apirasi Pada Pasien Stroke Pendahuluan Menurut Da Ta Dina S Keseha Ta N Provinsi Bengkulu , Pa Da Ta Hun 2019 Terda Pa T 1 . 899 Ka Sus Stroke Da N 127 Di Seluruh Dunia , Terma Suk Indonesia . Stroke A Da La*. 37–48.

Aryanti, D., & Masfuri. (2023). Analisis Asuhan Keperawatan Penerapan Intervensi Keperawatan Oral Motor Exercise Pada Pasien Stroke Iskemik Di Ruang Neurologi: Laporan Kasus. *Jhcn: Journal Of Health And Cardiovascular Nursing*, *3*(1), 9–16. Https://Doi.Org/10.36082/Jhcn.V3i1.942

Budiarti, E., Rahmani, E., Yusnita, E., Sumiati, C., Panca, U., & Bekasi, S. (2022). *Pengaruh Penerapan Oral Motor Untuk Anak Speech Delay Usia 2 - 4 Tahun Info Artikel Diterima : 10-09-2022 Direvisi : 19-10-2022 Disetuji : 20-10-2022 Pendahuluan Perkembangan Pada Anak Usia Dini Sangatlah Penting , Karena Pada Saat Usia Yang Disebut Masa*. *3*(10), 953–960.

Djuhendi, H., & Popon, P. (2021). Pengaruh Penerapan Metode Terapi Komunikasi Total Terhadap Pasien Afasia Global Pasca Stroke. *Jurnal Teras Kesehatan*, *3*(2), 70–83. Https://Doi.Org/10.38215/Jutek.V3i2.53

Freire, A. M. N., Gagliardi, R. J., & Dos Santos, M. D. (2020). Effect Of Speech Therapy Intervention Program For Non-Fluent Aphasic Patients After Stroke. *Codas*, *32*(6), 1–7. Https://Doi.Org/10.1590/2317-1782/20202019124

Geneva, R., & Usman, S. (2023). Gambaran Karakteristik Individu Dengan Kejadian Stroke Pada Pasien Poliknik Penyakit Saraf. *Jurnal Kedokteran Stm (Sains Dan Teknologi Medik)*, *6*(2), 159–167. Https://Doi.Org/10.30743/Stm.V6i2.466

Hägglund, P., Hägg, M., Levring Jäghagen, E., Larsson, B., & Wester, P. (2020). Oral Neuromuscular Training In Patients With Dysphagia After Stroke: A Prospective, Randomized, Open-Label Study With Blinded Evaluators. *Bmc Neurology*, *20*(1), 1–16. Https://Doi.Org/10.1186/S12883-020-01980-1

Halimatunnisa, M., Hersika Asmawariza, L., Hadi, A., Yulandasari, V., Wiksuarini, E., Wahyudi, I., & Muqarrobin, A. (2023). Faktor Risiko Stroke Di Rumah Sakit Umum Daerah Praya Tahun 2022. *Jurnal Kesehatan Qamarul Huda*, *11*(1), 371–381. Https://Doi.Org/10.37824/Jkqh.V11i1.2023.507

Kemenkes. (2023). Survei Kesehatan Indonesia 2023 (Ski). *Kemenkes*, 235.

Koto, Y., & Hidayatullah, A. (2025). *Efektivitas Terapi Wicara " Aiueo " Dan Melodi Intonasi Terapi Terhadap Peningkatan Kemampuan Berbahasa Pasien Stroke Dengan Afasia Motorik Di Ruang Cherry Rsud Cengkareng Tahun 2024 Effectiveness Of " Aiueo " Speech Therapy And Therapy Intonation Melodie*. *April*, 7717–7731.

Kristinsson, S., Basilakos, A., Elm, J., Spell, L. A., Bonilha, L., Rorden, C., Den Ouden, D. B., Cassarly, C., Sen, S., Hillis, A., Hickok, G., & Fridriksson, J. (2021). Individualized Response To Semantic Versus Phonological Aphasia Therapies In Stroke. *Brain Communications*, *3*(3). Https://Doi.Org/10.1093/Braincomms/Fcab174

Lumintang, M. (2024). Hubungan Usia, Jenis Kelamin, Diabetes Melitus Tipe Ii, Dan Hipertensi Dengan Kejadian Stroke Di Rsud Provinsi Ntb Tahun 2022. *Fakultas Kedokteran Universitas Islam Al-Azhar*, *01*(04), 220–227.

Mohammed, M., Zainal, H., Ong, S. C., Tangiisuran, B., Aziz, F. A., Sidek, N. N., Sha'aban, A., Ibrahim, U. I., Muhammad, S., Looi, I., & Aziz, Z. A. (2025). Prognostic Models Of Mortality Following First-Ever Acute Ischemic Stroke: A Population-Based Retrospective Cohort Study. *Health Science Reports*, *8*(2),

1–10. Https://Doi.Org/10.1002/Hsr2.70445

Musfidah Nisfil. (2024). *Penyakit Tidak Menular* (D. Putu Intan (Ed.); Cetakan Pe). Pt Sonpedia Publishing Indonesia.

Nasrullah, R., Suganda, D., Wagiati, N., & Riyanto, S. (2020). Ekspresi Verbal-Gramatikal Penyandang Afasia Broca Berbahasa Indonesia: Suatu Kajian Neurolinguistik. *Ranah: Jurnal Kajian Bahasa*, *9*(1), 16. Https://Doi.Org/10.26499/Rnh.V9i1.1490

Novalia Naluri Tasari, H., & Muryanti, M. (2023). Efektivitas Metode Semantik Divergen Terhadap Kemampuan Bahasa Ekspresif Pada Penderita Afasia Lancar Di Kecamatan Jebres. *Jurnal Terapi Wicara Dan Bahasa*, *1*(2), 289–296. Https://Doi.Org/10.59686/Jtwb.V1i2.41

Rahmawati, R. (2023). Pengaruh Range Of Motion (Rom) Pasif Dan Aktif Terhadap Kekuatan Otot Pada Pasien Stroke. *Mega Buana Journal Of Nursing*, *2*(1), 10–17. Https://Doi.Org/10.59183/Mbjn.V2i1.54

Robert Daniel, Desyani Ni Luh Jayanthi, Maretha Delima Engga. (2023). *Bunga Rampai : Patofisologi Sistem Saraf* (Arimaswati (Ed.); Cetakan Pe). Pt. Media Pustaka Indo.

Seli, P., & Harahap, S. (2021). Hubungan Faktor Risiko Dengan Angka Kejadian Penyakit Ginjal Kronik Di Rs . Hajimedan Pada Tahun 2020 Relation Of Risk Factors With Chronic Kidney Disease At Haji Hospital Medantahun 2020. *Jurnal Kedokteran Stm*, *Vol. 4 No.*(Ii), 129–136.

Sesep, F., Marbun, M., Murni, L., & Sagala, B. (2024). *Indonesian Trust Nursing Journal (Itnj) Pengaruh Latihan Range Of Motion Pasif Terhadap Kekuatan Otot Pada Pasien Stroke Non Hemoragik Di Murni Teguh Memorial Hospital*. *2*(2), 14–20.

Siregar, H. (2021). *Komunikasi Pasien Stroke Dengan Aphasia, Depresi Pasca Stroke Dan Tentang Hopelessness: Panduan Lengkap Stroke*. Nusamedia.

Virdiyanti, R., Septi Hendranti, E., Studi Prodi Sarjana Terapan, P., Ners, P., & Kesehatan Kemenkes Pontianak, P. (2024). Kemandirian Keluarga Meningkatkan Kemampuan Aktivitas Sehari-Hari Pasien Pasca-Stroke. *Jhcn Journal Of Health And Cardiovascular Nursing*, *4*(Vol. 4 No. 1 (2024): Journal Of Health And Cardiovascular Nursing), 1–10. Https://Doi.Org/10.36082/Jhcn.V4i1.1660

Who. (2023). *The Top 10 Causes Of Death 9 Desember 2020.* Https://Www.Who.Int/News-Room/Fact-Sheets/Detail/The-Top-10-Causes-Of- Death

Wso. (2022). *Wso Global Stroke Factsheet 09-02.2022*.