Increasing muscle strength through range-of-motion training in patients with Guillain-Barré syndrome at *RSUP Sardjito* General

Nailul Izza*, Kustiningsih Kustiningsih

Ners Profession, Faculty of Health Sciences, Universitas Aisyiyah Yogyakarta, Indonesia
*Email: nailulizza143@gmail.com

Abstract
Background: Guillain Barre Syndrome is an autoimmune condition in the form of polyradiculoneuropathy, characterized by progressive inflammation that affects the peripheral nervous system, Guillain Barre Syndrome begins with damage to the peripheral nerves due to an autoimmune response that results in weakness in the limbs. Therefore, effective nursing interventions are needed to increase the patient's muscle strength. Objective: This study aims to provide nursing care to Child N with Susp Guillain Barre Syndrome in the West Aster ward of RSUP (Central General Hospital) Dr. Sardjito. Method: This study applied a case study through the nursing care process from the assessment stage, diagnosis, nursing planning, nursing implementation, and evaluation carried out for three days from December 17-19, 2025. The data obtained from observation, interviews, physical examinations, and medical records. The case report was performed using the MRC (Medical Research Council) instrument scale to assess muscle strength. Results: After Range of Motion exercises showed an increase in the patient's muscle strength. Conclusion: Range of Motion (ROM) exercises in patients with Guillain Barre Syndrome showed an increase in muscle strength on the third day of implementation. Based on these findings, the researchers concluded that the Range of Motion intervention provided positively contributed to improving the patient's motor function and muscle strength.

Keywords: guillain-barré syndrome; impaired physical mobility; range of motion

1. Introduction
Guillain Barre Syndrome (GBS) is an autoimmune condition in the form of polyradiculoneuropathy, which is characterized by progressive inflammation that affects the peripheral nervous system. Guillain Barre Syndrome begins with damage to the peripheral nerves due to an autoimmune response. (Nguyen & Taylor, 2023). The resulting nervous system disorder involves demyelination of the peripheral and autonomic nervous systems, resulting in motor and sensory nerve dysfunction. Symptoms include motor nerve paralysis that gradually progresses from numbness, tingling, and weakness, beginning in the lower limbs and progressing to the upper body (Shang et al., 2021).

Each year, there are approximately 100,000 new cases *of Guillain-Barre Syndrome* (GBS) worldwide. The lowest estimated annual incidence rates per 100,000 population are found in Japan (0.44), China (0.67), Tanzania (0.83), and Finland (0.84). Conversely, the highest incidences are recorded in Chile (2.12) and Bangladesh (3.25) (Bellanti & Rinaldi, 2024). In Indonesia, the incidence of *Guillain-Barre Syndrome* (GBS) is estimated to range from 0.6 to 1.6 cases per 10,000 to 40,000 population. Based on data from Cipto Mangunkusumo Hospital (RSCM) Jakarta, 48 cases *of Guillain-Barre Syndrome* (GBS) were recorded during the period from the end of 2010 to 2011, with variations in the number of cases each month. In 2012, the number of GBS cases at RSCM increased by approximately 10% compared to the previous year (Putri et al., 2024).

Guillain-Barré Syndrome (GBS) sufferers will experience symptoms of muscle weakness that can develop up to four weeks, or what is known as the acute phase. However, in most cases, the most severe muscle weakness usually occurs within the first two weeks of the onset of symptoms, causing impaired physical mobility (Shah et al., 2022). After passing the acute phase, GBS patients enter a recovery phase that can last from several months to several years. In this phase, the process of nerve regeneration and recovery of muscle function through reinnervation begins to occur. (Kumar et al., 2021; Willison et al., 2016).During the recovery phase, approximately 10–20% of patients experience severe disabilities, such as residual paralysis, muscle weakness, contractures, and decreased fitness levels. This condition results in impaired physical mobility and can have an impact on reducing the patient's quality of life (Shah et al., 2022).

Physical exercise is an important therapy for GBS patients in the recovery phase because it can help restore muscle strength and endurance, body fitness, functional movement, and quality of life. (Sheriff, 2019)*Range of Motion (ROM)* exercises are an important intervention in the rehabilitation of Guillain Barre Syndrome patients. This exercise aims to maintain or improve the ability of optimal joint movement, as well as increase muscle strength and tone. Early mobilization through ROM exercises in *Guillain Barre Syndrome patients* can also increase muscle strength by stimulating motor units, so that more motor units are involved will contribute to increased muscle strength (Kiper et al., 2025a). The author aims to provide nursing care to An. N with *Susp Guillain Barre Syndrome* in the West Aster ward of Dr. Sardjito General Hospital.

2. Methods

This research method is a case report. This case report is conducted through the nursing care process from the assessment stage, establishing a diagnosis, nursing planning, nursing implementation, and evaluation. The sample in this case report is a patient suffering from the autoimmune disease *Guillain Barre Syndrome* who is being treated in the West Aster Ward of Dr. Sardjito General Hospital. The sample selection criteria include children aged > 10 years, having complete medical record data, and being willing to be interviewed regarding their identity, health history, and functional patterns.

After the sample was determined, data collection was carried out using several methods to obtain accurate and comprehensive information. The methods used in this case report include interviews, physical examinations, observations, and documentation studies. Interviews were conducted to collect information regarding the patient's identity, the person in charge, and the patient's medical history. A thorough physical examination was conducted from *head to toe* to objectively determine the patient's condition. The observation method was carried out by monitoring the patient's condition based on the results of the physical examination and medical records. In addition, documentation studies were conducted by reviewing and analyzing the patient's medical records covering all stages of nursing care including assessment, nursing diagnosis, nursing interventions, implementation, and evaluation. This *case report* uses the MRC *(Medical Research Council) instrument scale* to assess the muscle strength of patients with *Guillain Barre Syndrome*. The case report was conducted for three days from December 17 to 19, 2025, which aims to ensure that the data collected can support and support a more accurate analysis of nursing care for patients with *Guillain Barre Syndrome.*

3. Results and Discussion

3.1. Results

Based on the case management implemented in accordance with the stages of the nursing process, from assessment to evaluation, several important aspects require analysis. These aspects include the problems identified in the theoretical review, the accuracy of establishing a nursing diagnosis, and the effectiveness of intervention planning and implementation. Furthermore, the evaluation phase focuses on the patient's response to nursing interventions and their progress after receiving care. In this case, nursing interventions (An. F) were administered for three consecutive days to monitor changes in the patient's condition and evaluate the results. This process allows the nurse to assess the effectiveness of the interventions and adjust the nursing plan if necessary to achieve optimal patient outcomes.

3.1. Assessment

Nursing assessment is the initial stage of the nursing process that aims to systematically and comprehensively collect, verify, and communicate data about the client to evaluate and identify the client's health status. The data collected includes biological, psychological, social, and spiritual aspects, obtained through interviews, observations, and physical examinations (Frates, 2023).

This *Case Report* was conducted in the West Aster Ward of Dr. Sardjito General Hospital, the patient with the initials An. F, a 13-year-old male with the last education of elementary school and currently attending junior high school, the patient was treated since December 10, 2024 with a medical diagnosis of *Sups Guillain Barre Syndrome,* then an assessment was carried out on December 16, 2024.

The patient came to the hospital with complaints of weakness in the lower extremities. The patient was a referral from Hermina Wonogiri Hospital, referred to Dr. Sardjito General Hospital because An. F complained of pain in both back knees to the thighs and the patient felt increasingly weak in both

lower extremities. During the assessment, An. F complained that both legs felt weak, heavy when moved, sometimes felt pain in the back of the knees, and could no longer walk because they were no longer able to support body weight, An. F only lay on the bed in a supine position because he was unable to move his legs, An. F said he could tilt right and left but only his body, when he wanted to tilt or bend his legs, his father or mother helped him, An. F said that although his legs felt weak and he was unable to move them independently, he could still feel stimulation if massaged or moved, An. F said that his fingers were difficult to move in a grasping motion.

A head-to-toe physical examination on the lower extremity examination showed weakness in both legs, An. F could not move both legs independently, however, when given stimulation such as massage An. F could still feel the stimulation, limited movement and decreased ROM range of motion, while the examination of the upper extremities showed An. F could not grasp the fingers on both hands. Then a muscle strength assessment was carried out using the MRC *(Medical Research Council) instrument scale*, the results of a muscle strength value of 10 on a scale of 1, which means muscle contractions can be palpated without joint movement. Muscle contractions are visible but no movement occurs. The muscles are not strong enough to lift certain body parts against gravity or move them when in a position that reduces gravity. Small contractions can be detected by palpation (physical touch) but are not enough to affect movement (MRC, 2020).

In this *case report,* a cerebrospinal fluid analysis was performed and the results showed no signs of turbidity or discoloration indicating severe infection or bleeding. There was an increase in erythrocytes and PMNs (polymorphonuclear/neutrophils) indicating an acute inflammatory reaction, which allows for bacterial infection. There was an increase in protein indicating the possibility of a viral, bacterial, or inflammatory nerve syndrome infection such as *Guillain-Barre Syndrome* (GBS). In addition, there was a positive pandy indicating an increase in globulin protein, consistent with GBS or other inflammatory processes.

Pharmacotherapy in this case report included paracetamol 500 mg every 6 hours to reduce knee pain and mecobalamin 500 mg every 24 hours orally. Mecobalamin (methylcobalamin) contains vitamin B12, which plays a vital role in nerve regeneration, myelin synthesis, and nerve cell metabolism. In *Guillain-Barré Syndrome* (GBS), mecobalamin is not used as primary therapy but has a supportive function in accelerating the recovery of the peripheral nervous system (Ramadhani et al., 2024).

3.2. Nursing Diagnosis Analysis

Based on the assessment data, the nursing diagnosis established for the patient was impaired physical mobility related to neuromuscular disorders due to *Guillain-Barré Syndrome*. This condition was evidenced by weakness in the upper and lower limbs.

According to Tim Pokja SDKI DPP PPNI, (2018)the physical mobility disorder is defined as the presence of limitations in the physical movement of one or more extremities independently. According to (Potter & Perry, 2017) the physical mobility disorder is the presence of limitations in performing movements that can be caused by muscle weakness, balance disorders, or limitations of neurological function that affect the ability to walk or perform other activities. Based on the researcher's analysis, the patient showed major and minor signs that correspond to the validation criteria for the IDHS diagnosis. Therefore, in this case report, physical mobility disorders are the main nursing problem where the patient experienced physical weakness in the upper and lower extremities, decreased muscle strength, limited range of motion ROM and required assistance from others to move, and there was pain when the lower extremities were moved.

3.3. Nursing Planning Analysis

The diagnosis in this *case report* is determined based on the established diagnosis, namely physical mobility disorders. The author has a goal that is in accordance with SLKI, namely physical mobility (L.05042) which aims to improve the patient's physical mobility. The expected target, namely after 3x24 hours of nursing action, is an increase in the patient's physical mobility with the following outcome criteria: increased extremity movement, increased muscle strength, increased ROM range of motion, decreased limited movement, decreased pain, and decreased physical weakness.(Tim Pokja SLKI DPP PPNI, 2019).

The interventions established to improve the patient's physical mobility in this case report are mobilization support (I.05173) with an action plan to be carried out, namely identifying pain in both upper and lower extremities, identifying muscle strength in both upper and lower extremities, helping to perform ROM movements to increase muscle strength, involving the family to help the patient improve movement, teaching ROM gradually, collaborating with physiotherapy in strengthening the lower and upper limbs with *passive movement exercises* or passive range of motion exercises (PROM) (Tim Pokja SIKI DPP PPNI, 2018).

3.4. Nursing Implementation Analysis

Implementation is the implementation stage of a previously prepared nursing intervention plan, with the goal of helping the patient achieve the desired health outcomes. This process begins after the intervention plan is completed and focuses on nursing actions aimed at meeting the patient's needs and achieving specific treatment goals (M. Bustan & Dwi Purnama, 2023). In this *case report, a patient with Guillain-Barré Syndrome experienced impaired physical mobility, and was then given Range of Motion (ROM)* exercises to help improve upper and lower extremity muscle strength.

In the first stage of implementation, the author implemented the diagnosis of physical mobility disorders by identifying the presence of pain in both upper and lower extremities. This was done to determine the presence of pain in both extremities before movement was carried out, evaluate the effectiveness of the intervention, prevent injury, assess patient tolerance to movement, and improve the quality of nursing care. According to(Titus et al., 2024) Identifying pain before performing *Range of Motion* (ROM) exercises in patients with *Guillain-Barre Syndrome* (GBS) is crucial to ensure patient safety and comfort and prevent additional complications.

In the second implementation, the author identified the muscle strength of both upper and lower extremities. This aimed to determine the type and intensity of *Range of Motion exercises* to be administered, both active and passive, to align therapy goals or targets, to monitor neuromuscular development, and to prevent injury.(Gawande et al., 2024) Identifying muscle strength in the upper and lower extremities in patients with *Guillain-Barre Syndrome* (GBS) is crucial for designing effective rehabilitation interventions and monitoring patient progress. Furthermore, identifying muscle strength can determine the degree of muscle weakness in patients with *Guillain-Barre Syndrome* (GBS).

The third implementation, the author helps patients perform *Range of Motion (ROM) movements to improve blood circulation, increase muscle strength, and improve mobility. Performing Range of Motion (ROM)* exercises on patients with *Guillain-Barre Syndrome* (GBS) has an important purpose in the rehabilitation process to prevent complications and accelerate functional recovery (Kiper et al., 2025b). It can also prevent joint stiffness and contractures; improve circulation and reduce the risk of thrombosis; reduce pain and muscle tension; increase muscle strength and motor function; and improve quality of life and independence (Shaffer, 2023; van Doorn et al., 2023).

Fourth, the author involved the family to help the patient improve mobility. Family involvement is crucial in the rehabilitation process for patients with *Guillain-Barré Syndrome*, especially during the motor recovery phase. Families can be trained to assist with passive and active ROM exercises, which can help prevent joint stiffness, maintain muscle flexibility, and gradually improve blood circulation and muscle strength.

According to Savsek et al., (2021), ROM exercises performed consistently and assisted by caregivers or family members contribute significantly to the recovery of movement function and the prevention of complications such as joint contractures. Furthermore, educating families about proper ROM exercise techniques, timing, and monitoring for signs of fatigue are essential for effective and safe exercise (Leonhard et al., 2019).

Fifth, the author teaches ROM gradually. *Range of Motion* (ROM) exercises are an important part of the rehabilitation of *Guillain-Barre Syndrome* (GBS) patients, especially to prevent complications and accelerate the recovery of motor function (Ishwari Gawande et al., 2024). Range of Motion (ROM) exercises are performed to prevent joint contractures and deep vein thrombosis, improve blood circulation; improve cell nutrition and nerve function, and prevent neuropathy; increase muscle strength and functional mobility (Kiper et al., 2025c).

In this *case report*, the Range of Motion (ROM) exercises applied were Passive Range of Motion exercises performed for 3 x 24 hours, twice a day, for 15-30 minutes. The *Range of Motion* (ROM)

exercises were performed in three stages: preparation, implementation, and termination. In the preparation stage, the author ensured the patient's readiness before performing the exercises, identified any pain in the upper and lower extremities, identified the muscle strength of the upper and lower extremities, and positioned the patient in a supine and relaxed position.

In the implementation stage, the author performed passive *Range of Motion* (ROM) on the patient from the upper extremities to the lower extremities by moving the neck joints with flexion, extension, rotation, and lateral flexion movements; shoulder joints with flexion, extension, abduction, adduction, internal and external rotation, and circumduction movements; elbow joints with elbow flexion and extension movements, pronation and supination of the forearm; wrist and finger joints with wrist flexion and extension movements, finger flexion and extension; hip joints with flexion, extension, abduction, adduction, internal and external rotation movements; knee joints with flexion and extension movements; ankle joints and toes with dorsiflexion, plantar flexion, inversion, eversion, flexion and extension of the toes. Each joint movement was performed 2 x 8 counts (American Physical Therapy Association, 2023; Arsenault et al., 2016).

At the termination stage, the author evaluated the patient's feelings after passive Range of Motion (ROM) exercises, re-assessed the presence of pain and muscle strength of the upper and lower extremities, made a time contract for the next session, performed passive Range of Motion (ROM) exercises for three days and recorded the results of the implementation on the observation sheet (Ratu et al., 2025).

In the sixth implementation, the author collaborated with physiotherapists to strengthen the lower and upper limbs with *passive movement exercises* or passive range of motion (PROM). Collaboration between nurses and physiotherapists is a crucial step in the rehabilitation process for patients with neuromuscular disorders, such as *Guillain-Barré Syndrome* (GBS).

In practice, physiotherapists play a crucial role in designing appropriate exercise programs tailored to the patient's condition, monitoring muscle response and strength development, and providing education and training to caregivers and families to continue exercise beyond physiotherapy sessions. Nurses also help ensure PROM exercises are performed consistently and safely during daily care, and monitor for signs of discomfort or complications (Ong & Van der Schaaf, 2020).

3.5. Evaluation Analysis

Nursing evaluation is the final stage in the nursing process that aims to assess the extent to which the interventions that have been carried out are effective in achieving the stated goals. In this stage, the nurse assesses the patient's response to the nursing actions given, determines whether the goals have been achieved, and decides whether the care plan needs to be continued, modified, or stopped (Lubis, 2020). In this case report, an evaluation was obtained using the MRC *(Medical Research Council) instrument scale* to assess the patient's muscle strength for 3 x 24 hours, the implementation of Range of Motion (ROM) exercises has been carried out.

Table 1. Results of the MRC *(Medical Research Council) Scale Analysis*

Patient	Day 1		Day 2		Day 3	
	Pre ROM	Post ROM	Pre ROM	Post ROM	Pre ROM	Post ROM
An. F	1	1	1	1	1	2

(Medical Research Council) scale analysis results table shows the results of the 3-day implementation to An. F. Based on the table, *the Range of Motion* (ROM) exercise on the first day showed the results of the muscle strength scale before and after the ROM exercise, namely a scale of 1 with a value of 10. An. F showed a weak response but still felt movement when ROM was performed, was not yet able to hold the leg when the right and left knees were bent during flexion movements, and appeared unable to straighten and grip the fingers of the right and left hands.

The evaluation of the second day has not been resolved with the value of the muscle strength scale before and after the ROM exercise which is fixed on a scale of 1 with a value of 10, but An. F said the body felt more relaxed after the movement, when the flexion movement was done on the right leg up to the pelvis, child F was only able to lift his leg approximately 30 ^{o}, while the left leg was able to lift up to approximately 60 ^{o}, when the flexion movement was done on the right and left knees, child F was

only able to last for approximately 5 minutes, when the adduction movement was done on the left leg up to the pelvis, child F's left leg was only able to be moved approximately 45 º from the right leg, while the right leg was able to be moved approximately 60 º from the left leg. An. F looked weak but cooperative when passive ROM movements were performed.

The third day evaluation was partially completed with a scale before ROM exercise, namely scale 1 with a muscle strength value of 10 and after ROM exercise, scale 2 with a muscle strength value of 25. In the third day evaluation, An. F said he was able to hold his leg longer than the previous day when the leg was bent, when flexion movements were performed on the right leg up to the hip in the count of 1-5, child F was only able to lift his leg approximately 35 º, but when the count of 6-8 and the count of 8, both right legs of child F were able to be lifted to approximately 50 º, while the left leg was able to be lifted approximately 60 º-70 º. When the adduction movement was performed on the left leg, in the first count of 1-8 the left leg was only able to be moved 45 º-50 º from the right leg and in the count of 1-8 both left legs were able to be moved approximately 50 º-55 º from the right leg, while the right leg was able to be moved approximately 60 º-70 º from the left leg.

3.2. Discussion

Guillain-Barre Syndrome (GBS) is an acute autoimmune disorder affecting the peripheral nervous system, characterized by progressive muscle weakness and rapid motor decline, particularly in the lower extremities (van Doorn et al., 2023). In the case of An. F, significant lower extremity weakness, pain, and limited range of motion were the primary focus of nursing interventions, with passive ROM exercises as a rehabilitative approach consistently applied for 3 days.

Passive ROM exercises have been clinically proven to maintain joint flexibility, prevent contractures, and improve blood circulation to peripheral tissues, which is very important in the neurological recovery of GBS patients.(Shaffer, 2023; Kiper et al., 2025a)In this study, passive ROM exercises were performed twice daily for 15–30 minutes each session. Evaluation using the MRC Scale showed an increase in muscle strength from a score of 1 (contraction without movement) to a score of 2 (muscle movement without resistance to gravity), indicating the initial success of the rehabilitation program. These changes, although gradual, demonstrate that consistent ROM interventions can provide neuromuscular stimulation that promotes motor recovery. This is in line with research Merdiyanti et al., (2021)confirming that ROM exercises are effective in increasing muscle strength and maintaining joint mobility in GBS patients.

Active family involvement in the ROM process is a crucial aspect that strengthens the intervention's effectiveness. Family education on proper ROM exercise techniques, monitoring fatigue, and identifying signs of discomfort significantly contribute to supporting the patient's functional recovery. According to Savsek et al., (2021), caregiver support has been shown to improve patient adherence to rehabilitative exercises and accelerate motor function recovery.

Referring to the results of the implementation that has been carried out for 3x24 hours to the patient, there was a change in muscle strength after *Range of Motion* (ROM) exercises were given to the patient. ROM exercises began to show effectiveness on the third day with an increase in muscle strength scores from a scale of 1 to a scale of 2. This indicates that the ROM intervention provided contributed positively to improving the patient's motor function and muscle strength. Although the changes occur gradually, *Range of Motion* (ROM) exercises need to be done routinely and gradually to help smooth blood flow to peripheral nerves, reduce pain, maintain and improve joint flexibility, increase muscle strength, and prevent pressure ulcers.

Guillain-Barre Syndrome (GBS) causes damage to the peripheral nerves that regulate muscle movement and body sensation. *Range of Motion* (ROM) exercises have been shown to be effective in the rehabilitation of *Guillain-Barre Syndrome* (GBS) patients. In research,(Merdiyanti et al., 2021) ROM exercises are a viable approach to improving upper and lower extremity muscle strength in patients with muscle weakness. Both active and passive ROM exercises can improve joint range of motion in GBS patients. Joint movement increases blood flow to the joint capsule, providing nutrients and allowing bones to move smoothly and painlessly (Indrayana & Wahyudi, 2020).

ROM physical exercises can increase muscle strength in GBS patients by doing exercise frequencies ranging from 2–5 times per week with a duration of 15–30 minutes per session for 6–12 weeks (Permana & Laily, 2025). Range of Motion (ROM) exercises can prevent disability due to

Guillain Barre Syndrome by reducing the risk of contractures and pressure sores, preventing muscle atrophy, smoothing blood vessels, maintaining flexibility and range of motion of joints, and maintaining muscle and ligament elasticity (permana & Laily, 2025; Smeltzer, 2020).

ROM exercises, although simple, have significant physiological and functional impacts. ROM helps prevent complications from immobility such as contractures, pressure ulcers, deep vein thrombosis (DVT), and muscle atrophy Smeltzer, (2020). This effectiveness makes ROM exercises an integral part of nursing care for GBS patients experiencing impaired physical mobility. Furthermore, ROM also facilitates improved neuroplasticity and nerve regeneration, especially when combined with supportive pharmacotherapy such as methylcobalamin Ramadhani et al., (2024). Ongoing education and documentation, as well as cross-professional collaboration with physical therapists, further strengthen the success of comprehensive nursing care.

4. Conclusion

Based on the results of data analysis and discussion, it can be concluded that Range of Motion (ROM) exercises for 3 x 24 hours in Guillain-Barré Syndrome (An. F) patients at Dr. Sardjito General Hospital showed effectiveness in increasing muscle strength. Initial assessments showed impaired physical mobility due to lower extremity weakness, which was analyzed as a neuromuscular disorder. After ROM intervention, there was an increase in muscle strength from scale 1 to scale 2 on the third day, which indicates that ROM exercises contributed positively to improving the patient's motor function and muscle strength.

5. Acknowledgement

The author would like to thank God Almighty. for the abundance of His grace and guidance so that this Final Scientific Work for Nursing can be completed well. This Final Scientific Work for Nursing is a small offering for both parents and three siblings of the researcher. Both great parents who have always been an inspiration and motivator in life, who always pay attention and support the researcher in any matter, the researcher would like to express his gratitude for all the sacrifices, prayers, advice, and moral and moral support given so that the researcher is able to complete this Final Scientific Work for Nursing and the journey to realize the Nursing Profession. Thank you to the academic supervisor, field supervisor, and all nursing staff in the West Aster Ward of Dr. Sardjito General Hospital who have guided the author in completing this Final Scientific Work for Nursing.

References

American Physical Therapy Association. (2023). *Physical Therapy Guide to Guillain-Barré Syndrome.* Retrieved from https://www.choosept.com/guide/physical-therapy-guide-guillain-barre-syndrome.

Arsenault, N.S., Vincent, P.O., Shen, Y.B.H., Bastien, R., Sweeney, A., & Zhu, S. (2016). Influence of exercise on patients with Guillain-Barré syndrome: A systematic review. In *Physiotherapy Canada* (Vol. 68, Issue 4, pp. 367–376). University of Toronto Press Inc. https://doi.org/10.3138/ptc.2015-58

Bellanti, R., & Rinaldi, S. (2024). Guillain-Barré syndrome: a comprehensive review. In *European Journal of Neurology* (Vol. 31, Issue 8). John Wiley and Sons Inc. https://doi.org/10.1111/ene.16365

Frates, F. de. (2023). *Basic Concepts of Nursing*. Satya Wacana Christian University.

Gawande, I., Akhuj, A., & Samal, S. (2024). Effectiveness of Physiotherapy Intervention in Guillain Barre Syndrome: A Case Report. *Cureus*. https://doi.org/10.7759/cureus.52062

Indrayana, A., & Wahyudi, W. (2020). The Effect of Active Range of Motion (ROM) Exercises on Increasing Joint Range of Motion in GBS Patients. *Semarang Health Polytechnic Journal*.

Ishwari Gawande, Aditi Akhuj, & Snehal Samal. (2024). Effectiveness of Physiotherapy Intervention in Guillain Barre Syndrome: A Case Report. *Cureus Part of Springer Nature*.

Kiper, P., Chevrot, M., Godart, J., Cieślik, B., Kiper, A., Regazzetti, M., & Meroni, R. (2025a). Physical Exercise in Guillain-Barré Syndrome: A Scoping Review. In *Journal of Clinical Medicine* (Vol. 14, Issue 8). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/jcm14082655

Kiper, P., Chevrot, M., Godart, J., Cieślik, B., Kiper, A., Regazzetti, M., & Meroni, R. (2025b). Physical Exercise in Guillain-Barré Syndrome: A Scoping Review. In *Journal of Clinical Medicine* (Vol. 14, Issue 8). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/jcm14082655

Kiper, P., Chevrot, M., Godart, J., Cieślik, B., Kiper, A., Regazzetti, M., & Meroni, R. (2025c). Physical Exercise in Guillain-Barré Syndrome: A Scoping Review. In *Journal of Clinical Medicine* (Vol. 14, Issue 8). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/jcm14082655

Kumar, G., Arora, L., & Arora, R. (2021). Effectiveness Of High and Low Intensity Rehabilitation Programmer in Chronic Phase of Guillain Barre Syndrome Patients: A Randomized Control Trial. *European Journal of Physiotherapy and Rehabilitation Studies*, *2* (1). https://doi.org/10.46827/ejprs.v2i1.53

Leonhard, SE, Mandarakas, MR, Gondim, FAA, Bateman, K., Ferreira, MLB, Cornblath, DR, van Doorn, PA, Dourado, ME, Hughes, RAC, Islam, B., Kusunoki, S., Pardo, CA, Reisin, R., Sejvar, JJ, Shahrizaila, N., Soares, C., Umapathi, T., Wang, Y., Yiu, EM, … Jacobs, B. C. (2019). Diagnosis and management of Guillain–Barré syndrome in ten steps. *Nature Reviews Neurology*, *15* (11), 671–683. https://doi.org/10.1038/s41582-019-0250-9

Lubis, AJ (2020). Nursing Evaluation as the Final Phase of the Nursing Process. *Research Gate*.

M. Bustan, & Dwi Purnama. (2023). Descriptive Study of Documentation of Mental Health Nursing Care by Nurses at the Mental Hospital of Southeast Sulawesi Province. *Kendari Nursing Journal*.

Merdiyanti, D., Ayubbana, S., Hs, SS, Dharma, AK, & Metro, W. (2021). Application of Passive Range of Motion (ROM) to Improve Muscle Strength of Non-Hemorrhagic Stroke Patients. *Jurnal Cendikia Muda*, *1* (1).

MRC. (2020). *Medical Research Council (MRC)ScaleforMuscleStrength_NeurologicalScales*.

Nguyen, T. P., & Taylor, R. S. (2023). *Guillain Barre Syndrome*. National Library of Medicine. https://www.ncbi.nlm.nih.gov/books/NBK532254/#:~:text=Guillain-Barré syndrome (GBS), which can progress to paralysis.

Ong, K. L., & Van der Schaaf, M. (2020). Interprofessional collaboration in neurological rehabilitation: A systematic review. *Disability and Rehabilitation, 42(24), 3486–3497. https://Doi.Org/10.1080/09638288.2019.1689176*.

Permana, GP, & Laily, I. (2025). *Physical Exercise Prescription Protocol for Muscle Strength Recovery in GBS Patients.*

Permana, GP, & Laily, I. (2025). Physical Exercise Intake Protocol for Muscle Strength Recovery in Guillain-Barre Syndrome Patients: A Literature Review. *Journal of Health Research, Poltekkes Depkes Bandung*, *17* (1), 197–213. https://doi.org/10.34011/juriskesbdg.v17i1.2725

Potter, P. A., & Perry, A. G. (2017). *Fundamentals of Nursing, 9th ed.*

Putri, A., Amalia, R., Nursing Professional Education Study Program, M., Nursing, Syiah Kuala University, Banda Aceh, F., & Medical Surgical Nursing Science, B. (2024). *Nursing Care at Mr. T With Guillain Barre Syndrome: A Case Study*.

Ramadhani, A., Astuti, I., Widiastuti, MG, & Purwanti, N. (2024). Methylcobalamin as a candidate for chronic peripheral neuropathic pain therapy: review of molecular pharmacology action. In *Korean Journal of Pain* (Vol. 37, Issue 4, pp. 299–309). Korean Pain Society. https://doi.org/10.3344/kjp.24171

Ratu, M., Widhikarsa, P., & Purwanti, OS (2025). Application of Range of Motion Intervention to Reduce Paraesthesia in Guillain Barre Syndrome: A Case Study. *6* (1).

Savsek, L., Stergar, T., Strojnik, V., Ihan, A., Koren, A., Spiclin, Z., & Jazbec, S.S. (2021). Impact of aerobic exercise on clinical and magnetic resonance imaging biomarkers in persons with multiple sclerosis: An exploratory randomized controlled trial. *Journal of Rehabilitation Medicine*, *53* (4). https://doi.org/10.2340/16501977-2814

Shaffer, H.M. (2023). *The Progression, Treatment, and Rehabilitation of Guillain Barré the Progression, Treatment, and Rehabilitation of Guillain Barré Syndrome: Case Report Syndrome: Case Report*. https://commons.und.edu/pt-grad/766

Shah, N., Shrivastava, M., Kumar, S., & Nagi, R. S. (2022). Supervised, individualized exercise reduces fatigue and improves strength and quality of life more than unsupervised home exercise in people

with chronic Guillain-Barré syndrome: a randomized trial. *Journal of Physiotherapy*, *68* (2), 123–129. https://doi.org/10.1016/j.jphys.2022.03.007

Shang, P., Feng, J., Wu, W., & Zhang, H.L. (2021). Intensive Care and Treatment of Severe Guillain–Barré Syndrome. In *Frontiers in Pharmacology* (Vol. 12). Frontiers Media SA https://doi.org/10.3389/fphar.2021.608130

Sheriff, Y. (2019). *Impacts of Exercise on Functional Ability of Recovering GBS Patients: An Integrative Literature Review Patients: An Integrative Literature Review Running Head: Impacts of Exercise on GBS Mobility & Recovery Impacts of Exercise on Functional Ability of Recovering GBS Patients: An Integrative Literature Review Impacts of Exercise on GBS Mobility & Recovery 2 Impacts of Exercise on GBS Mobility and Recovery Background & Significance*. https://via.library.depaul.edu/nursing-colloquium

Smeltzer, S.C. et al. (2020). *Brunner & Suddarth's Textbook of Medical-Surgical Nursing. 15th ed.*

SDKI Working Group Team of the Indonesian National Nurses Association (2018). *Indonesian Nursing Diagnosis Standards (1st Edition). SDKI Working Group Team of the Indonesian National Nurses Association (2018)*.

SIKI DPP PPNI Working Group Team. (2018). *Indonesian Nursing Intervention Standards*.

SLKI DPP PPNI Working Group Team. (2019). *Indonesian Nursing Outcome Standards*.

Titus, J., Sarmiento, B., & Crouse, R. (2024). Management of Severe Pain in a Case of Sensory Guillain-Barre Syndrome. *Cureus*. https://doi.org/10.7759/cureus.64432

van Doorn PA, Van den Bergh PYK, Hadden RDM Avau B Rajabally, Y.A., Umapathi, T., … Willison, H.J. (2023). European Academy of Neurology/Peripheral Nerve Society Guideline on diagnosis and treatment of Guillain–Barré syndrome. In *European Journal of Neurology* (Vol. 30, Issue 12, pp. 3646–3674). John Wiley and Sons Inc. https://doi.org/10.1111/ene.16073

Willison, H. J., Jacobs, B. C., & van Doorn, P. A. (2016). Guillain-Barré syndrome. In *The Lancet* (Vol. 388, Issue 10045, pp. 717–727). Lancet Publishing Group. https://doi.org/10.1016/S0140-6736(16)00339-1