



## Nursing Management of the Patient Developing Quadriplegia Due to Neurological Involvement After COVID-19: A Case Report

Funda AKDURAN<sup>1</sup> , Bahar EMIROGLU<sup>2</sup> 

<sup>1</sup>Department of Nursing, Faculty of Health Sciences, Sakarya University, Sakarya, Turkey

<sup>2</sup>Institute of Health Science, Sakarya University, Sakarya, Turkey

### ABSTRACT

COVID-19 first emerged in China, spread quickly, and was declared a pandemic by the World Health Organization. Neurological complications have led to important symptoms in patients diagnosed with COVID-19. These symptoms have substantially affected patients' quality of life, caused them to depend on others, and prolonged their recovery processes with anxiety and hopelessness. In this case report, the care process applied to an individual who developed quadriplegia due to neurological involvement after COVID-19, according to the "Nursing Model Based on Activities of Living", is shared. With effective evidence-based nursing care, the patient's quality of life was improved, existing problems were alleviated, and the patient was protected against complications.

*Turk J Int Med* 2023;5(1):58-65

DOI: [10.46310/tjim.1112662](https://doi.org/10.46310/tjim.1112662)

**Keywords:** COVID-19, quadriplegia, nursing model based on activities of living, case report.



## Introduction

COVID-19 emerged in Wuhan, China, in December 2019 when a person exhibited symptoms in the seafood market, resulting in a severe pandemic spreading rapidly.<sup>1</sup> After the first positive case was revealed in our country in March 2020, the World Health Organization declared COVID-19 a pandemic. The spread of COVID-19 through droplets has been the most critical factor in increasing the rate of spread. The infection can be spread by pre-symptomatic or asymptomatic carriers who do not show symptoms. The average time elapsed after illness until the beginning of the symptoms is five days.<sup>2</sup> While the most common symptoms are cough, weakness, joint pain, high fever, shortness of breath, respiratory failure, and acute respiratory failure may develop in advanced cases of COVID-19.<sup>3</sup> It is reported that COVID-19 adversely affects the respiratory and nervous systems, can lead to central nervous system involvement through the ACE2 receptor, and coronavirus nucleic acid is seen in the cerebrospinal fluid.<sup>4</sup> The neurological symptoms include headache, change in consciousness, vertigo, inability to smell and paresthesia, and even symptoms similar to Guillain-Barré syndrome.<sup>5</sup> Muscle-joint pain and weakness are described due to the affected skeletal muscle, and the increased serum creatine kinase (CK) level is noteworthy.<sup>6</sup> Moreover, COVID-19 is thought to trigger many neuromuscular diseases through the genetic or immune system or cause the progression of the existing neuromuscular disease.<sup>7</sup> In neurological symptoms occurring in COVID-19 infection, a multidisciplinary approach should be adopted.

This case report was prepared to classify the basic nursing care needs of the patient, who was conscious, in need of care and admitted to the palliative care clinic with quadriplegia developing after COVID-19 infection, according to the “Nursing Model Based on Activities of Living” (NMBAL), to specify nursing diagnoses and evidence-based nursing interventions, and to present them in the nursing care plan.

## Case Report

A 42-year-old male patient received treatment for complications related to COVID-19 infection for 1.5 years. The patient, who was infected with COVID-19 in 2020, received symptomatic COVID-19 therapy in the hospital for four days. During the treatment, his general condition was good; he had no complaints other than weakness, tingling in his feet and mild loss of sensation and was discharged at the end of 4 days. Loss of sense increased in the feet of the patient, who continued to work for 15 days, and urinary incontinence started in the following days. No pathology was observed in the electroneuromyography screening performed on the patient, who presented to the neurology outpatient clinic with these complaints. However, he was admitted to the neurology ward for follow-up. The patient, who started to experience weakness and loss of sensation in the upper extremities within two days, became immobile after developing quadriplegia on the third day and underwent plasmapheresis. During this period, the patient had no problems with the respiratory system, and no pathological condition was observed in the laboratory tests. A cervical lesion was detected in the patient who underwent cervical magnetic resonance imaging (MRI), but no pathological formation was encountered due to the biopsy. The individual was followed up in the neurology ward as a person with quadriplegia and an immobilised patient for about one month and referred to another hospital outside the province for advanced physical therapy and rehabilitation. In the third week of the treatment in the referral hospital, a pulmonary embolism occurred due to respiratory distress, chest pain and loss of consciousness. Cardiopulmonary resuscitation (CPR) was applied to the patient who had a cardiac arrest during the embolectomy procedure. He continued to receive treatment in the intensive care unit for approximately one week. After the treatment, the patient was referred to the intensive care unit of the province where he lived upon his request. After receiving treatment for about two weeks, the patient was admitted to the palliative care clinic. The patient was hospitalised in the clinic and given basic physical therapy exercises, medical treatment and nursing care for six months. Upon his request, he was referred to a hospital in

another province after he gained partial strength in his extremities and his clinical condition improved to a certain extent.

### Care Plan According to the Nursing Model Based on Activities of Living

The patient's problems were determined according to the Nursing Model Based on Activities of Living.<sup>8,9</sup> They are also presented in detail in Table 1.

**Table 1.** Identification of descriptive characteristics according to the NMBAL

Activities of Living	Descriptive Characteristics/Signs and Symptoms	Nursing Diagnosis
Maintaining a safe environment	Loss of function in the extremities caused by neurological involvement, dependence on in-bed movement, weakness Frequent urinary catheter change, neurogenic bladder, invasive procedures	Risk of injury Risk of infection
Communication	Inability to accept the disease, having to receive treatment for a long time, being away from the family and work, fear of death	Anxiety
Respiration	Permanent dysfunction in the right lung following the embolectomy procedure	Ineffective respiratory pattern
Nutrition	No problem	
Excretion	Neurological involvement, inactivity and stress	Constipation
Individual cleaning and dressing	Dependence on the family in personal care, lying down continuously without moving, and weight gain	Risk of deterioration in skin integrity
Control of body temperature	Hyperthermia due to urinary tract infections (38.3 °C), reproduction in urine culture	Risk of infection
Movement	Immobility caused by quadriplegia, weakness in extremities, and loss of function Involuntary contractions in different muscle groups caused by neurological involvement and intense physical exercises	Impairment of physical movement acute pain
Work and entertainment	Inability to work, the transition from active social life to the dependent isolated life	Ineffective role performance
Expressing sexuality	No problem	
Sleep and rest	No problem	
Death	Uncertainties about the disease process, extremely slow progress of the recovery process, and fear of not being able to be the same as before	Hopelessness

## Maintaining A Safe Environment

*Nursing diagnosis 1:* "Risk of injury" due to loss of function in the extremities caused by neurological involvement, dependence on in-bed movement, and weakness.

*Aim:* Non-occurrence of physical trauma and injury in the patient.

### *Nursing interventions*

1. The patient is oriented to the environment during hospitalisation (introduction of the ward and the room, use of the call bell, etc.), and the fall risk is identified using the ITAKI Fall Risk Scale.

2. Safety measures are taken while mobilising the patient. Safety of the patient's room and bed surroundings is ensured.

3. The patient bed is set to the lowest level. The patient's cabinet/shelves are placed near the bed so that he can easily reach the items he may need.

4. The bed barriers are fixed while the patient is lying down.

5. To ensure patient safety, at least two people accompany him during care delivery.

6. It is ensured that the valuable equipment (wheelchair) used by the patient during mobilisation is intact. It is necessary to make sure that equipment is safe to be used for the patient.

7. Since high-dose anticoagulant drugs may increase bleeding during trauma, sharp objects are kept away from the patient, and unnecessary invasive procedures are avoided.

*Evaluation:* The patient's safety was ensured during treatment, and no injury occurred. The fall risk was determined as "high."

*Nursing diagnosis 2:* "Infection risk" due to frequent urinary catheter change, neurogenic bladder, and invasive procedures.

*Aim:* Decrease in signs and symptoms of infection in the patient.

### *Nursing interventions:*

1. The patient is encouraged to take 2-3 litres of fluid daily.

2. Urinary retention and negative conditions caused by the urinary catheter are evaluated by following up on what the patient has taken and excreted during the day.

3. Patient caregivers are trained in perineum care and hand hygiene.

4. Laboratory findings are evaluated (urinary analysis, such as hematuria, pyuria, and amount of bacteria in urine, causing microorganisms with urine culture).

5. Attention is paid to aseptic techniques during urinary catheter insertion.

6. Signs and symptoms of urinary tract infection (such as pain in the lower abdomen, burning, blurred urine colour, and sharp odour of the urine) are followed up.

7. Attention is paid to the administration times of the ordered antibiotic (IV cephalosporin), and the effectiveness of the treatment is checked.

*Evaluation:* The frequency of recurring urinary tract infections decreased gradually in the first 1-1.5 months of treatment, and urinary tract infections did not develop in the last 3-4 months. The patient's intake and excretion were approximately +250 mL in 24 hours.

## Communication

*Nursing diagnosis 3:* "Anxiety" due to the inability to accept the disease, having to receive treatment for a long time, being away from the family and work, and fearing death.

*Aim:* Not observing the signs and symptoms of anxiety and the patient's ability to use coping methods effectively.

### *Nursing interventions:*

1. The patient is accompanied during his acute, stressful period and not left alone.

2. All treatment methods are explained to the patient, and his questions are answered.

3. Care is delivered in a calm, supportive, and safe manner.

4. The patient's justification is accepted, not disputed, and he can express his thoughts without being judged.

5. Unnecessary assurances are avoided since they may increase the patient's concerns.

6. Interview is planned with the spiritual support unit of the hospital, providing active services and followed up.

7. Depending on the doctor's request, sedative drugs are given, and their effectiveness is checked during distress.

8. His relationships with other anxious patients are limited.

9. The patient is taught relaxation exercises and assisted in doing them.

10. Information is given about reducing nervousness, such as music.

*Evaluation:* The patient reported that his level of anxiety decreased significantly compared to the past, and his level of coping increased.

### Respiration

*Nursing diagnosis 4:* “Ineffective respiratory pattern” due to permanent dysfunction in the right lung following the embolectomy procedure.

*Aim:* Ensuring that the patient breathes effectively and adequately.

*Nursing interventions:*

1. The patient’s respiratory rate and blood oxygen saturation (SpO<sub>2</sub>) value are measured during the day, and the doctor is informed about changes related to the respiratory parameter.

2. The patient is given deep breathing and coughing exercises. If necessary, respiratory physiotherapy is provided.

3. The importance of the TriFlo exercise is explained, and the patient is helped to do the exercise.

4. The patient is enabled to lie down in Semi-147 Fowler’s/Fowler’s position.

5. Lung sounds are checked during the day, and the doctor is informed in case of a negative situation.

6. Tapotement is performed and taught to the patient and the patient’s relatives. They are told to perform it when secretion increases.

7. The patient is recommended not to be in an environment with air pollution. The room is ventilated frequently, and the patient is kept away from damp and humid environments.

8. It is ensured that the patient does not use tobacco derivative products such as cigarettes.

*Evaluation:* No respiratory distress was observed in the patient who regularly performed TriFlo exercise 3 times a day. In his vital follow-up, the patient’s SpO<sub>2</sub> value was 95-96%, and his respiratory rate was 20-21 per minute.

### Excretion

*Nursing diagnosis 5:* “Constipation” due to neurological involvement, inactivity, and stress.

*Aim:* Regular excretion of the patient.

*Nursing interventions:*

1. Distension, pain in the abdomen, and defecation are questioned and written on the daily follow-up form.

2. The mobility of the patient is increased within his in-bed capacity.

3. If not contraindicated, fluid intake is increased, and the patient is given fibrous foods during the day (such as fresh fruits, vegetables, and cereals).

4. Current drugs (such as those that cause constipation) are checked.

5. The patient is warned about consuming beverages such as soda, coffee and tea, which cause loss of fluid in the body.

6. The patient is informed about eating regularly, not skipping meals, 170 and eating slowly.

7. The patient and his relatives are taught abdominal exercises and massage, which help accelerate bowel movements.

8. Non-narcotic analgesics are preferred in pain control.

9. Patient privacy is given importance during bottom cleaning.

*Evaluation:* It was observed that the defecation frequency of the patient, whose defecation frequency was once a week before the nursing interventions, increased to 3 times a week after the interventions.

### Individual Cleaning and Dressing

*Nursing diagnosis 6:* “Risk of deterioration in skin integrity” due to dependence on the family in personal care, lying down continuously without moving, and weight gain.

*Aim:* Identification of factors that may lead to pressure ulcers and prevention of their formation.

*Nursing interventions:*

1. Skin, clothes, and bedding are kept clean and dry, and the patient is informed about the necessity to prefer clothes made of cotton.

2. The patient’s position is changed frequently, and pressure areas are checked for redness.

3. The importance of using barrier cream during the patient's body care is explained to the patient and his relatives.

4. Light massage is applied around the pressure areas. It is ensured that bedsheets and clothes are not wrinkled.

5. If needed, air or anti-decubitus mattresses are used. Precautions are taken to keep the skin away from the rubbed surface.

6. The patient is provided with adequate fluid intake and protein-rich nutrition.

7. When the patient lies down in the supine position, the back of the waist is supported with a towel or a small pillow not to impair the body posture.

*Evaluation:* The patient did not develop any pressure ulcers, and no redness and tenderness were observed in the pressure areas.

### **Movement**

*Nursing diagnosis 7:* "Impairment of physical movement" due to immobility caused by quadriplegia, weakness in extremities, and loss of function.

*Aim:* Enhancing the strength and durability of the individual's extremities and reaching and supporting the maximum body functions.

#### *Interventions:*

1. The patient's compliance with physical therapy is evaluated, and the patient is encouraged to receive treatment.

2. The patient's position is changed every 2-4 hours, and it is checked whether a pressure ulcer has occurred.

3. The patient is encouraged and assisted in using extremity-strengthening equipment.

4. During the day, the patient is mobilised with a wheelchair to ensure his safety.

5. It is ensured that the bed brakes are off when the patient is taken to the bed, and the patient is prevented from falling by keeping the bed barriers up while lying on the bed.

6. Areas with reduced sensitivity in the extremities are protected against excessive heat, cold and impacts.

7. The patient and his relatives are informed about in-bed passive exercises, ensuring that he continues his daily activities.

8. The movement tolerance of the individual is evaluated (such as vital signs, duration, pain control, patient's strength, and hunger-satiety state).

*Evaluation:* While the patient received treatment in the ward, significant progress was observed regarding increasing extremity range of motion, sensation, and strength. The patient can lift his arms without help and hold light objects with his hands for a short time.

*Nursing diagnosis 8:* "Acute pain" due to involuntary contractions in different muscle groups caused by neurological involvement and intense physical exercises.

*Aim:* Relieve the patient's pain and ensure his comfort.

#### *Nursing interventions:*

1. The pain characteristics are determined (such as severity, region, type of pain, initial features, and duration).

2. Factors that increase and decrease pain are identified.

3. The patient's pain is accepted, and the patient is kept away from stress and additional sources of stress as much as possible.

4. When the severity of the pain increases during exercise, a break is taken, and the patient rests in bed.

5. When the severity of the pain increases, analgesic therapy is applied upon the doctor's request, and its effectiveness is evaluated.

6. Analgesics suitable for the pharmacological management of the pain are selected (nonopioids, opioids, local analgesics).

7. The doctor is informed when pharmacological interventions are ineffective.

8. Relaxation techniques (such as breathing exercises, diverting attention, massage, and listening to music) that will help the patient cope with the pain are taught.

*Evaluation:* The patient's pain continues after exercise, but pain can be controlled with relaxation and breathing exercises without needing analgesics. When the patient was requested to rate his pain, he described the severity of his pain as 6, among the parameters from 1 to 10.

## Work and Entertainment

*Nursing diagnosis 9:* “Ineffective role performance” due to the inability to work and transition from active social life to a dependent isolated life.

*Aim:* Preventing the individual from feeling incompetent and helping him have realistic expectations about himself.

### *Nursing interventions:*

1. The patient is allowed to express his feelings and thoughts.
2. The patient's stress and anxiety levels are minimised.
3. The patient's communication with family members is kept uninterrupted, and he can see his children by complying with infection and hospital rules.
4. Exercises are planned in line with the patient's capacity to prevent a decrease in his physical activity levels.
5. The patient is not allowed to neglect himself.
6. The patient's capacity is determined, and his roles are re-determined accordingly.
7. To avoid regression in the patient's physical activities, appropriate activity programs are organised.

*Evaluation:* As the patient's muscle strength and performance increased, his belief in himself and his future was also observed to increase.

## Death

*Nursing diagnosis 10:* “Hopelessness” due to uncertainties about the disease process, plodding recovery progress, and fear of being unable to be the same as before.

*Aim:* Ensuring that the patient verbally states he is not hopeless.

### *Nursing interventions:*

1. The patient is informed about people who had the same disease and recovered.
2. Positive feedback is given about the patient's achievements during treatment.
3. The patient is reminded that the treatment process is long, but his motivation is the best treatment during this period.
4. Upon the patient's request, he can benefit from support units such as a psychological counsellor and spiritual support unit.

5. The role of the disease in the patient's hopelessness is assessed.

6. The effect of hopelessness on the patient's physical condition is evaluated (such as appearance, nutrition, cleaning and sleeping habits).

7. It is revealed whether the patient needs information about the procedures.

8. Patient uncertainty is eliminated by providing sufficient information about tests or procedures.

*Evaluation:* In the last interview, the patient stated that he was not as hopeless as in the beginning, thanks to his progress during the treatment process, and his belief in himself increased with each passing day.

## Discussion

Studies on COVID-19 show that the virus can be associated with numerous neurological complications, as seen in the case.<sup>5,10</sup> In a patient with weakness in the extremities, a lesion was detected in the cervical MRI, as stated in the case report, and SARS-CoV-2 was seen in the CSF examination of the patient.<sup>11</sup> In another case involving neurological symptoms, acute cerebrovascular disease, confusion, movement disorders and involuntary twitching were reported, and these symptoms are similar to those stated in the case report.<sup>12</sup>

In a study conducted in our country, neurological findings were reported by 34.7% of 239 patients infected with COVID-19. The most common neurological symptom was headache (27.6%).<sup>13</sup> In a study on the psychological effects of COVID-19 in our country, 1026 patients were examined. As a result of the study, it was reported that one out of every four participants exhibited moderate-severe anxiety symptoms, and about one out of every three participants exhibited moderate-severe hopelessness symptoms.<sup>14</sup> In the patient, anxiety, hopelessness, and uncertainty about the future were the most prominent psychological symptoms. Therefore, the approach to individuals infected with COVID-19 should be multifactorial, and it should be kept in mind that psychological and spiritual support and medical treatment are essential.

The patient in the case report had a person

with quadriplegia and a depressive picture in the initial days of treatment in the palliative care clinic. When the patient's treatment was completed, sensation and strength increased in his hands and arms, and he started to have a mild sensation in the lower extremities. The safe bond established with the patient and psychological and spiritual support reduced his anxiety and helped him think more positively about himself. Nursing interventions contributed to the acceleration of the recovery process of the patient suffering from a disease whose treatment and care process were not yet fully known. With effective and safe nursing care, the patient's quality of life was improved, existing problems were alleviated, and the patient was protected against complications. This also contributed to nurses working in the palliative care clinic and providing care for patients diagnosed with COVID-19.

There is a need for more nursing care plans and care models to determine the effective nursing care in permanent damages caused by the COVID-19 infection. Planning case reports within the scope of nursing models are critical in guiding the nursing care of cases diagnosed with COVID-19. The pandemic's effect continues worldwide, and nursing studies on effective patient care during this period are critical due to their contribution to the field.

### Conflict of Interests

The authors declare that there is no conflict of interest about this manuscript.

### Funding Sources

The authors report no funding to disclose.

### Authors' Contribution

Literature Review, Critical Review, and Manuscript preparing held by all authors.

### References

1. T.C. Sağlık Bakanlığı COVID-19 Bilgilendirme Platformu. COVID-19 nedir? Available at:
2. <https://covid19.saglik.gov.tr/TR-66300/covid-19-nedir.html>. Accessed February 10, 2022 (in Turkish).
3. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of coronavirus disease 2019 (COVID-19): A review. *JAMA*. 2020 Aug; 324(8):782-93. doi: 10.1001/jama.2020.12839.
4. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, Liu L, Shan H, Lei CL, Hui DSC, Du B, Li LJ, Zeng G, Yuen KY, Chen RC, Tang CL, Wang T, Chen PY, Xiang J, Li SY, Wang JL, Liang ZJ, Peng YX, Wei L, Liu Y, Hu YH, Peng P, Wang JM, Liu JY, Chen Z, Li G, Zheng ZJ, Qiu SQ, Luo J, Ye CJ, Zhu SY, Zhong NS; China Medical Treatment Expert Group for Covid-19. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020 Apr 30;382(18):1708-20. doi: 10.1056/NEJMoa2002032.
5. Baig AM, Khaleeq A, Ali U, Syeda H. Evidence of the COVID-19 virus targeting the CNS: Tissue distribution, host-virus interaction, and proposed neurotropic mechanisms. *ACS Chem Neurosci*. 2020 Apr 1;11(7):995-8. doi: 10.1021/acscchemneuro.0c00122.
6. Payus AO, Liew Sat Lin C, Mohd Noh M, Jeffree MS, Ali RA. SARS-CoV-2 infection of the nervous system: A review of the literature on neurological involvement in novel coronavirus disease-(COVID-19). *Bosn J Basic Med Sci*. 2020 Aug 3;20(3):283-92. doi: 10.17305/bjbm.2020.4860.
7. Ucaroglu N, Kaya Ö, Kotan D. Myalgia frequency in patients with COVID-19 and its relationship with creatine kinase levels. *Duzce Med J*. 2020 Nov 30;22(Suppl 1):S34-8. doi: 10.18678/dtfd.776953.
8. Öztürk Ü, Tamam Y. COVID-19 and neurology. *Dicle Med J*. 2021 Sep 1;48(Suppl 1):S49-54 (in Turkish). doi: 10.5798/dicletip.1004787.
9. Kavurmacı M, Demirel BC. COVID-19 and nursing care. *J Educ Res Nurs*. 2021 Apr 30;18(Suppl 1):S14-9 (in Turkish). doi: 10.5152/jern.2021.71463.
10. Çelik S, Karadağ A, eds. Hemşirelik Bakım Planları: Tanılar, Girişimler ve Sonuçlar. 1. baskı. İstanbul: Akademi Yayınları; 2019 (in Turkish).
11. Li H, Xue Q, Xu X. Involvement of the nervous system in SARS-CoV-2 infection. *Neurotox Res*. 2020 Jun;38(1):1-7. doi: 10.1007/s12640-020-00219-8.
12. Domingues RB, Mendes-Correa MC, de Moura Leite FBV, Sabino EC, Salarini DZ, Claro I, Santos DW, de Jesus JG, Ferreira NE, Romano CM, Soares CAS. First case of SARS-COV-2 sequencing in cerebrospinal fluid of a patient with suspected demyelinating disease. *J Neurol*. 2020 Nov;267(11):3154-6. doi: 10.1007/s00415-020-09996-w.
13. Wu Y, Xu X, Chen Z, Duan J, Hashimoto K, Yang L, Liu C, Yang C. Nervous system involvement after infection with COVID-19 and other coronaviruses. *Brain Behav Immun*. 2020 Jul;87:18-22. doi: 10.1016/j.bbi.2020.03.031.
14. Karadağ Ö, Öztürk B, Sonkaya AR. A prospective clinical study of detailed neurological manifestations in patients with COVID-19. *Neurol Sci*. 2020 Aug;41(8):1991-5. doi: 10.1007/s10072-020-04547-7.
15. Erdoğdu Y, Koçulu F, Sevim C. An investigation of the psychosocial and demographic determinants of anxiety and hopelessness during COVID-19 pandemic. *J Clin Psy*. 2020;23(Suppl 1):S24-37 (in Turkish). doi: 10.5505/kpd.2020.35403.

