

Nursing Care for Patients with Sickle Cell Disease

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Abstract:

Nursing care for patients with sickle cell disease (SCD) is essential for managing pain, preventing complications, and promoting overall well-being. A key aspect of care is thorough pain assessment and management, as patients often experience severe pain during vaso-occlusive crises. Nurses should utilize a multidimensional approach that includes pharmacological interventions, such as opioid analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs), along with non-pharmacological methods like heat application and relaxation techniques. Educating patients about recognizing triggers and symptoms of crises is crucial for early intervention, as is encouraging hydration to prevent sickling of red blood cells. In addition to pain management, nurses play a critical role in monitoring for potential complications such as infection, acute chest syndrome, and organ damage. Preventive care measures, including vaccinations and regular health check-ups, are vital to reduce the risk of infection. Nurses should also provide emotional support, as SCD can lead to psychological challenges due to chronic illness stress. Collaborating with a multidisciplinary team to address the physical, emotional, and social needs of patients can enhance care outcomes and improve quality of life.

Keywords: Sickle Cell Disease, Nursing Care, Pain Management, Vaso-Occlusive Crises, Pharmacological Treatment, Non-Pharmacological Interventions, Hydration, Complications, Infection Prevention, Emotional Support, Multidisciplinary Care.

Introduction:

Sickle Cell Disease (SCD) is an inherited blood disorder characterized by the presence of abnormal hemoglobin polymerization, leading to the distortion of red blood cells (RBCs) into a rigid, crescent or sickle shape. This pathological alteration in red blood cell morphology precipitates a series of complications, including hemolytic anemia, vaso-occlusive crises, and increased susceptibility to infections. Worldwide, SCD affects millions, with a particularly high prevalence observed in individuals of African, Mediterranean, Middle Eastern, and Indian descent. The necessity for comprehensive nursing care in this context cannot be overstated, as nurses play a pivotal role in managing the multifaceted needs of patients with SCD [1].

The complexity of SCD necessitates a multi-disciplinary approach to care, where nurses serve not only as primary caregivers but also as educators, advocates, and researchers. The nursing profession is uniquely positioned to address the comprehensive health care needs of patients with SCD through direct patient care, health promotion, and emotional support. As frontline healthcare providers, nurses must be knowledgeable about the pathophysiology of SCD, understand the implications of associated complications, and be equipped with the skills necessary to manage acute crises and chronic manifestations [2].

One of the critical elements of nursing care for patients with SCD is pain management. Vaso-occlusive crises, which are often debilitating and can require hospitalization, necessitate an acute response from nursing professionals. Effective pain management involves not only pharmacological interventions but also non-pharmacological strategies, patient education, and psychosocial support. Nurses are often the first point of contact for patients experiencing a crisis; thus, their ability to assess pain, implement appropriate interventions, and communicate effectively with both the healthcare team and the patient is essential [3].

In addition to managing pain, nurses must also focus on preventive care strategies. These include the provision of vaccinations, prophylactic antibiotics, and the screening for complications such as acute chest syndrome and stroke. Education about hydration, diet, and lifestyle modifications also falls within the purview of nursing care. Furthermore, since SCD significantly impacts the psychological well-being of patients, nurses must be adept at recognizing mental health issues and providing the necessary referrals and support [4].

Transitioning from pediatric to adult care poses unique challenges for adolescents with SCD, and consequently, nursing care must be tailored to facilitate this transition. Nurses must understand the developmental stage and contemporary issues faced by adolescents to adequately prepare them for independent management of their illness. Adolescents often encounter barriers, such as a lack of knowledge about their condition, which can hinder their ability to care for themselves effectively. Therefore, nurses play a crucial role in empowering patients and fostering self-management skills [5].

The role of nurses extends beyond direct patient care to include health education and community outreach. Many patients with SCD experience social stigma and discrimination, which can further complicate their care. Nursing staff is uniquely suited to provide education to families and communities, advocating for awareness and understanding of the disease. By participating in community health initiatives and educational programs, nurses can aid in reducing stigma and improving the quality of life for individuals living with SCD [6].

Research in SCD leads to the continuous evolution of nursing practices. Evidence-based practice is vital in improving health outcomes for this population; hence, nurses should engage with current research to inform their nursing interventions and contribute to further studies. Increased understanding of genetic counseling, emerging therapies, and long-term management strategies through research can pave the way for improved nursing care standards [7].

Assessment and Diagnosis of Sickle Cell Disease:

Sickle cell anemia (SCA) is a hereditary blood disorder characterized by the production of abnormal hemoglobin, known as hemoglobin S (HbS). This condition can have profound implications for patient health, resulting in chronic pain episodes, increased risk of infections, and a range of other complications. Effective evaluation and diagnosis are crucial for managing sickle cell anemia, which entails a comprehensive understanding of its genetic basis, clinical manifestations, and laboratory techniques used in diagnosis [8].

Sickle cell anemia is inherited in an autosomal recessive manner. This means that a person must inherit two copies of the mutated gene, one from each parent, to exhibit symptoms of the disease. Individuals with a single copy of the gene are considered to have sickle cell trait (SCT), which typically does not result in any significant health issues but can pass the gene on to their offspring. The abnormal hemoglobin in sickle cell anemia causes red blood cells to adopt a rigid, sickle-like shape, particularly under low-oxygen conditions. These distorted cells can lead to blockages in blood vessels, resulting in pain crises and other complications [9].

Clinical Presentation

Diagnosis often begins with a careful assessment of patient history and clinical symptoms. Individuals with sickle cell anemia may present with a range of clinical manifestations, including:

1. **Pain Crises:** Patients frequently experience episodes of severe pain due to the obstruction of blood flow in small blood vessels, leading to tissue ischemia [10].
2. **Anemia:** The sickle-shaped cells have a shorter lifespan than normal red blood cells, resulting in chronic hemolytic anemia.
3. **Infections:** Increased susceptibility to infections, particularly from encapsulated bacteria, is common due to the impaired spleen function [10].
4. **Organ Damage:** Over time, the repeated sickling and resultant blood vessel obstruction can lead to organ dysfunction, including the spleen, kidneys, lungs, and liver.
5. **Delayed Growth and Development:** Children with sickle cell anemia may experience delayed growth and puberty due to chronic anemia and nutrient deficiencies [10].

Given these varied symptoms, it is evident that a comprehensive diagnostic approach is necessary to confirm the presence of sickle cell anemia [10].

Evaluation and Diagnostic Methods

The evaluation and diagnosis of sickle cell anemia involve a combination of clinical assessments and laboratory tests [11].

1. **History and Physical Examination:** The diagnostic process typically begins with a complete medical history, including family history of sickle cell disease and any past symptoms or complications experienced by the patient. A thorough physical examination aims to identify signs of anemia, organ dysfunction, and any acute complications [11].
2. **Blood Tests:** The cornerstone of diagnosing sickle cell anemia involves specific blood tests:

- **Complete Blood Count (CBC):** This test assesses the overall health of the patient and helps quantify the degree of anemia by measuring hemoglobin levels and red blood cell counts. In sickle cell anemia, patients often present with lower levels of hemoglobin compared to healthy individuals [11].
 - **Hemoglobin Electrophoresis:** This laboratory technique is essential for identifying the specific types of hemoglobin in a patient's blood. For individuals with sickle cell anemia, hemoglobin electrophoresis will demonstrate the presence of hemoglobin S. In cases of heterozygosity or sickle cell trait, both hemoglobin A (normal) and hemoglobin S may be present [12].
 - **Sickle Cell Test:** A simple and rapid test, often using a drop of blood, can indicate the presence of sickle-shaped cells. Although this test is not definitive for diagnosis, it can be an indicative screening tool [13].
3. **Genetic Testing:** Genetic testing may be conducted to confirm the mutation responsible for sickle cell anemia, especially when parents are carriers of the trait. This testing can also clarify ambiguous results from hemoglobin electrophoresis [13].
 4. **Newborn Screening:** Many countries have implemented routine newborn screening programs for sickle cell disease. This involves testing infants shortly after birth, which allows for early diagnosis and management strategies. Early intervention can reduce complications associated with sickle cell anemia and improve overall quality of life.
 5. **Imaging Studies:** In some cases, imaging studies such as ultrasounds may be used to assess blood flow and identify complications like stroke or splenic crisis [13].

Pain Management Strategies:

Sickle Cell Disease (SCD) is a complex genetic blood disorder that primarily affects red blood cells, leading to significant health complications, including severe pain episodes known as vaso-occlusive crises. These crises can be triggered by various factors, including dehydration, extreme temperatures, and infections. The pain is often intense and can interfere with patients' daily activities, mental health, and overall quality of life. Given the chronic nature of SCD and the episodic pain crises that characterize the condition, effective pain management strategies are critical [14]. Pharmacological treatment remains a cornerstone of pain management in Sickle Cell Disease. Options range from over-the-counter medications to more complex regimens prescribed by healthcare providers.

Non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and naproxen are often utilized for pain relief. They work by reducing inflammation and altering pain perception. While effective for mild to moderate pain, their use may be limited due to potential gastrointestinal side effects and the risk of renal impairment with prolonged use [15].

For moderate to severe pain crises, opioids play a crucial role in management. Medications like morphine, hydromorphone, and oxycodone may be administered in a hospital setting or prescribed for home use. Despite their effectiveness, opioids carry risks of dependency, tolerance, and other side effects, necessitating close monitoring by healthcare professionals. Tailoring opioid therapy to the individual's pain experiences and using protocols such as scheduled dosing or patient-controlled analgesia can improve efficacy while minimizing adverse effects.

In addition to primary analgesic therapy, adjunctive medications may enhance pain relief. Gabapentin and pregabalin, typically utilized for neuropathic pain, can also be beneficial in managing complex pain syndromes associated with SCD. Antidepressants, particularly those in the class of serotonin-norepinephrine reuptake inhibitors (SNRIs), may provide pain relief while addressing co-occurring depressive symptoms common in SCD patients. Furthermore, corticosteroids can be employed in specific instances to combat inflammation and pain during acute crises [16].

Non-pharmacological approaches to pain management are essential in a comprehensive care plan for patients with Sickle Cell Disease. These strategies can include psychological support, physical therapy, and complementary therapies.

Chronic pain, especially in conditions such as SCD, can lead to considerable psychological distress. Psychological interventions, including cognitive-behavioral therapy (CBT), can help patients develop coping strategies, manage anxiety, and alter maladaptive thought patterns related to pain. Mindfulness-based stress reduction and relaxation techniques have also shown efficacy in reducing pain perception and improving overall quality of life [17].

Physical therapy can play a vital role in managing pain by improving mobility, strength, and endurance. A well-structured physical rehabilitation program can help prevent deconditioning during pain episodes and improve functional outcomes. Techniques such as gentle stretching, aquatic therapy, and supervised exercise programs tailored to the patient's abilities can enhance physical well-being and reduce pain frequency [17].

Complementary therapies, including acupuncture, massage therapy, and chiropractic care, have gained popularity as adjuncts to traditional medical approaches. While the evidence for their effectiveness varies, many patients report improvements in pain control and overall well-being. These therapies should be considered within a multidisciplinary approach, ensuring they complement medical treatments without interfering with required medications [17].

Holistic Approaches and Lifestyle Modifications

The management of Sickle Cell Disease requires a holistic perspective that encompasses the physical, emotional, and social dimensions of health. Lifestyle modifications can contribute significantly to pain management and overall health [18].

1. Hydration and Nutrition

Adequate hydration is crucial for individuals with SCD, as dehydration can precipitate vaso-occlusive crises. Patients are encouraged to maintain fluid intake and monitor hydration levels, particularly during periods of increased activity or heat. Nutrition education highlighting the importance of a balanced diet rich in vitamins, antioxidants, and minerals can also help bolster the immune system and reduce the severity and frequency of pain episodes [18].

2. Stress Management

Since stress is a recognized trigger for pain crises, implementing stress management techniques is vital. Activities such as yoga, meditation, and deep-breathing exercises can facilitate relaxation and may decrease the frequency of painful episodes. Establishing a strong support system, including family, friends, and support groups, is equally important for emotional resilience [19].

3. Education and Self-Management

Empowering patients through education about SCD, its complications, and effective self-management strategies fosters a sense of control and promotes better health outcomes. Patients who understand their condition and recognize early signs of crises are more likely to seek timely interventions, potentially mitigating the severity of pain [20].

Preventive Care and Health Maintenance:

Sickle Cell Anemia (SCA) is a hereditary blood disorder characterized by the production of abnormal hemoglobin known as hemoglobin S. This mutation leads to the distortion of red blood cells into a sickle or crescent shape, resulting in various complications that can affect the patient's quality of life significantly. Preventive care and health maintenance are crucial for individuals living with Sickle Cell Anemia, enabling them to manage symptoms efficiently, reduce the frequency of complications, and enhance overall health outcomes [21].

To appreciate the importance of preventive care in SCA, one must first comprehend the underlying mechanisms of the condition. Unlike normal red blood cells that are flexible and round, sickle-shaped cells are rigid and sticky. These abnormally shaped cells can block blood flow in small vessels, leading to episodes of severe pain known as sickle cell crises. Additionally, the fragility of these cells results in their premature destruction, leading to anemia. Common complications associated with the disease include vaso-occlusive crises (VOCs), acute chest syndrome, infections, and organ damage [21].

Patients with SCA often experience chronic pain, fatigue, and susceptibility to infections, which complicates their overall health. Chronic hemolytic anemia and the risk of stroke further necessitate vigilant preventive care to mitigate risks and manage symptoms effectively [22].

Importance of Preventive Care

Preventive care for individuals with Sickle Cell Anemia focuses on strategies designed to prevent complications, manage pain, and address the psychosocial aspects of the disease. This encompasses routine monitoring, vaccinations, prophylactic medications, patient education, and lifestyle alterations [23].

1. **Routine Medical Follow-Ups:** Regular check-ups with healthcare professionals, including hematologists, are essential for monitoring the disease's progression and managing complications. These appointments typically involve blood tests to assess hemoglobin levels, organ function, and overall health. Early detection of potential complications like organ damage or pulmonary issues significantly enhances treatment efficacy and reduces long-term risks [23].
2. **Vaccinations:** Individuals with SCA are particularly vulnerable to infections, notably those caused by encapsulated bacteria like *Streptococcus pneumoniae*. Therefore, vaccinations against pneumococcus, meningococcus, and *Haemophilus influenzae* type b are critical preventive measures. Additionally, annual flu vaccinations and the COVID-19 vaccine are crucial in protecting these patients from respiratory infections which can precipitate crises [23].

3. **Prophylactic Antibiotics:** Children diagnosed with Sickle Cell Anemia often receive prophylactic penicillin from the age of two months up to five years to help prevent life-threatening infections. This practice has greatly reduced mortality rates in infants and young children with SCA [23].
4. **Hydroxyurea Therapy:** Hydroxyurea is a medication that results in increased fetal hemoglobin (HbF) production, which helps to reduce the frequency of pain crises and other complications associated with Sickle Cell Anemia. Regular use of hydroxyurea can significantly improve quality of life and life expectancy for many individuals with SCA [23].

Managing Pain and Other Complications

Pain management is a crucial component of preventive care for individuals with Sickle Cell Anemia. Patients must work closely with their healthcare providers to establish personalized pain management plans that may include medication, physical therapy, and behavioral strategies [24].

1. **Pain Management:** Opioids and non-opioid medications are often utilized to help patients cope with pain crises. Non-pharmacologic interventions, including hydration, heat application, and relaxation techniques, can also provide significant relief. Psychological counseling and support groups may be beneficial in helping patients cope with chronic pain's psychological impacts [24].
2. **Education on Crisis Prevention:** Patients and their families must be educated about recognizing early signs of a sickle cell crisis. Avoiding triggers such as dehydration, extreme temperatures, and high altitudes can help reduce the frequency of crisis episodes. Encouraging a balanced diet, adequate hydration, and regular exercise while avoiding strenuous activities can contribute to prevention [24].
3. **Supplements and Nutrition:** Ensuring adequate intake of vitamins, minerals, and folic acid is vital for patients with Sickle Cell Anemia because of their increased nutrient needs due to hemolysis and rapid cell turnover. Nicotinamide riboside and L-Arginine supplementation have emerged as potential adjunct therapies to improve vascular function and reduce the frequency of VOCs, though ongoing research continues to evaluate their effectiveness [24].

Psychosocial Considerations and Support

Chronic illness can take a toll beyond physical health, often leading to emotional and social challenges. Therefore, providers should promote holistic care encompassing mental health support alongside regular medical management.

1. **Support Groups:** Encouraging participation in support groups dedicated to individuals with SCA can help alleviate feelings of isolation. Sharing experiences with others who face similar challenges fosters a sense of community and provides valuable coping strategies [25].
2. **Psychological Counseling:** Professional counseling may be necessary for patients experiencing depression, anxiety, or other mental health concerns related to their diagnosis. Collaborating with psychologists or psychiatrists to address these issues proactively promotes better overall health and adherence to treatment plans.
3. **Education and Advocacy:** Educating patients and family members about Sickle Cell Anemia, its complications, and health maintenance strategies empowers them to take control of their health. Advocacy for better healthcare access, research funding, and public awareness can help shape a more informed approach to SCA management and support efforts toward finding a cure [25].

Management of Complications:

Sickle cell disease (SCD) is a genetic blood disorder characterized by the production of abnormal hemoglobin, specifically hemoglobin S. This abnormal hemoglobin causes red blood cells to assume a rigid, sickle-like shape, leading to various complications that affect the organ systems and overall health of affected individuals. The management of these complications is critical for improving the quality of life and increasing life expectancy in patients with SCD [26].

Sickle cell disease primarily affects individuals of African, Mediterranean, Middle Eastern, and Indian ancestry due to evolutionary selective pressure against malaria. SCD comprises various genotypes, with the most common being homozygous sickle cell anemia (HbSS). Patients with SCD experience episodes of vaso-occlusive crisis (VOC), where sickled red blood cells block blood flow, causing acute pain and leading to tissue ischemia and damage. Chronic complications may include organ damage, increased risk of infections, and pulmonary complications. With advancements in medical care, the prognosis for individuals with SCD has improved, but complications associated with the disease persist and require comprehensive management [26].

Complications of Sickle Cell Disease

1. **Vaso-Occlusive Crises:** These painful episodes are often triggered by dehydration, stress, or temperature changes. Episodes can lead to acute chest syndrome (ACS) and may result in hospitalization [27].
2. **Acute Chest Syndrome (ACS):** This serious complication is characterized by chest pain, fever, and respiratory symptoms, often leading to hypoxemia and requiring urgent medical attention.

3. **Infection:** Patients with SCD are at an increased risk for infections, particularly from encapsulated organisms such as *Streptococcus pneumoniae*. This risk is due to functional asplenia resulting from splenic infarctions caused by sickle cell blockage of blood flow [27].
4. **Stroke:** The risk of cerebrovascular accidents is substantially higher in SCD patients due to impaired blood flow and vascular occlusion.
5. **Organ Damage:** Chronic complications, including liver, kidney, and lung damage, occur due to recurrent ischemia and hemolysis [28].
6. **Avascular Necrosis:** Reduced blood supply to bone can lead to necrosis, commonly affecting the hip and shoulder joints [29].
7. **Pulmonary Hypertension:** This chronic condition develops over time as a result of sickling within the pulmonary circulation, leading to heart failure and decreased exercise tolerance [29].

Management Strategies

Effective management of SCD complications requires a multipronged approach, including preventive measures, acute interventions, and long-term care [30].

Preventive Care

1. **Vaccination and Prophylaxis:** Patients should receive routine vaccinations against infections, particularly with pneumococcal and meningococcal vaccines. In addition, penicillin prophylaxis is recommended from infancy to reduce the risk of invasive pneumococcal infection [30].
2. **Hydroxyurea Therapy:** This medication increases fetal hemoglobin levels, thereby reducing the frequency of painful crises and acute chest syndrome. Hydroxyurea also has benefits in reducing leukocyte counts, which plays a role in the sickling process.
3. **Regular Screening for Complications:** Routine imaging and laboratory tests can help identify organ damage and monitor for complications such as stroke and pulmonary hypertension. Transcranial Doppler ultrasonography is particularly useful for assessing stroke risk in pediatric patients [30].

Acute Management

1. **Pain Management:** Effective pain control during VOC is crucial. Opioids remain the cornerstone of therapy, with adjunctive non-pharmacologic interventions such as hydration and heat application. A multidisciplinary approach involving physical and occupational therapy can also be beneficial [31].
2. **Management of Acute Chest Syndrome:** This condition requires prompt treatment, often with oxygen supplementation, intravenous fluids, and broad-spectrum antibiotics. Patients may require blood transfusion or bronchodilators [31].
3. **Management of Infections:** Prompt diagnosis and treatment of infections with empiric antibiotics are essential. Patients should be educated on recognizing the signs of infection to seek timely medical attention [31].

Long-term Care

1. **Transfusions and Iron Chelation:** For patients with recurrent VOC or those who develop severe complications, regular blood transfusions may be indicated. Long-term transfusion therapy poses a risk of iron overload, necessitating iron chelation therapy to prevent organ damage [32].
2. **Bone Marrow or Stem Cell Transplantation:** This is currently the only potential cure for SCD, particularly indicated in patients with severe disease and suitable sibling donors. Advances in transplantation techniques have made this option more accessible [32].
3. **Gene Therapy:** Emerging strategies aimed at correcting the genetic defect causing SCD are under research, with preliminary trials showing promise in providing long-term solutions for affected individuals [32].

Patient Education and Self-Management:

Sickle cell disease (SCD) is a hereditary blood disorder characterized by the production of abnormal hemoglobin known as hemoglobin S. This abnormality leads to the distortion of red blood cells (RBCs) into a crescent or 'sickle' shape, which can cause various complications, including pain episodes, infections, anemia, and damage to organs. Globally, SCD primarily affects individuals of African, Mediterranean, Middle Eastern, and Indian descent. Given the chronic nature of this condition and its significant impact on patients' lives, patient education and effective self-management strategies are paramount to improving outcomes and enhancing quality of life [33].

To fully appreciate the importance of patient education and self-management in SCD, it is crucial to understand the disease's pathophysiology. In SCD, the presence of sickle hemoglobin causes the RBCs to become rigid and sticky. These sickled cells can obstruct blood flow in the small blood vessels, leading to vaso-occlusive crises, commonly known as sickle cell crises. This results in acute pain episodes that can last for hours to days. Additionally, the sickled cells have a shorter lifespan than normal RBCs, resulting in chronic anemia and fatigue [34].

Moreover, individuals with SCD are at increased risk for infections, particularly from encapsulated bacteria due to splenic dysfunction. Organ damage, including stroke, acute chest syndrome, and renal impairment, can also complicate the illness. Thus, the comprehensive management of SCD typically involves pain management, blood transfusions, vaccinations, and potentially hydroxyurea therapy to reduce the frequency of sickle cell crises and ameliorate symptoms [35].

The Importance of Patient Education

Patient education is vital for those living with SCD. Education empowers patients with the knowledge necessary to manage their condition effectively, understand the potential complications, and recognize the importance of adherence to therapies. It encompasses several components:

1. **Disease Understanding:** Patients should be educated about how SCD affects their body, the symptoms to expect, and the potential emergencies they may face. Understanding the role of sickle-shaped cells in disease progression can help patients anticipate and mitigate issues [36].
2. **Pain Management:** Pain is a hallmark of SCD. Patients should learn to identify triggers for vaso-occlusive crises, such as dehydration, extreme temperatures, or strenuous exercise. Knowledge of pain management strategies—both pharmacological (e.g., nonsteroidal anti-inflammatory drugs, opioids) and non-pharmacological (e.g., heat application, hydration, relaxation techniques)—is essential [37].
3. **Preventative Care:** Education must emphasize preventative measures to reduce the risk of complications. Regular medical check-ups, vaccinations (e.g., against pneumococcus, meningococcus, and influenza), and appropriate antibiotic prophylaxis are instrumental in preventing infections. Understanding self-care practices such as adequate hydration and avoiding extreme temperatures can also play a decisive role in prevention [37].
4. **Nutrition and Lifestyle Choices:** A balanced diet rich in fruits, vegetables, whole grains, lean protein, and healthy fats can support overall health and well-being. Patients should be educated on how nutrition impacts fatigue and energy levels, as well as the importance of staying hydrated. Lifestyle choices, including smoking cessation, regular physical activity, and stress management, should be strongly encouraged [37].
5. **Navigating Healthcare Systems:** Patients need tools to effectively communicate with healthcare providers, understand treatment options, and articulate their symptoms. Educational programs should equip patients with knowledge about managing appointments, insurance, and medication adherence [38].

Self-Management Strategies

Self-management refers to the proactive strategies that patients employ to maintain their health. In SCD, effective self-management can significantly influence the quality of life and reduce hospitalizations.

1. **Monitoring Symptoms:** Patients should cultivate awareness of their body's signals. Keeping a pain diary, tracking symptoms, and noting frequency and intensity can help healthcare providers tailor a management plan that meets individual needs [39].
2. **Medication Adherence:** Successfully managing SCD often requires a regimen of medications. Educating patients about their medications—why they are necessary, how to take them correctly, and potential side effects—can enhance adherence. Using pill organizers, setting reminders, and having family support can also help patients stay on track [40].
3. **Support Systems:** SCD can be emotionally taxing. A robust support system comprising family, friends, healthcare providers, and support groups is invaluable. Peer support groups provide a platform for sharing experiences and strategies, helping to alleviate feelings of isolation [41].
4. **Crisis Management:** Patients should learn to recognize when to seek emergency care. Developing a crisis management plan that includes when to call for help and what initial steps to take can be life-saving.
5. **Advocacy:** Patients can serve as advocates for themselves by articulating their needs and preferences within the healthcare system. This may involve asking questions, seeking referrals to specialists, or requesting second opinions when necessary [42].

Psychosocial Support and Quality of Life:

Sickle cell anemia (SCA) is a hereditary blood disorder characterized by the production of abnormal hemoglobin known as hemoglobin S (HbS). This condition leads to the deformation of red blood cells into a rigid, crescent or sickle shape, which can result in severe health complications, including painful vaso-occlusive crises, increased risk of infections, and various chronic health issues. While medical advancements have improved the understanding and treatment of sickle cell anemia, the psychosocial dimensions of living with this condition are equally critical. Psychosocial support plays a pivotal role in enhancing the quality of life for individuals affected by SCA, addressing both their mental health needs and overall well-being [43].

Sickle cell anemia poses numerous challenges not only on a physical level but also on psychosocial levels. The chronic nature of the disease often leads to recurrent hospitalizations, and pain episodes can be debilitating, significantly impacting an individual's physical abilities and emotional state. Patients may experience a range of symptoms, from acute pain to fatigue, along with long-term complications such as stroke, organ damage, and chronic pain. As a result, the disease presents a unique set of stressors that can contribute to a decline in mental health, including anxiety, depression, and other emotional difficulties [43].

Moreover, children and teenagers with sickle cell anemia face specific developmental challenges. They may encounter difficulties in educational settings due to frequent absences and may struggle with social isolation when peers cannot understand the limitations imposed by their illness. Adults with sickle cell disease may also contend with issues related to employment, such as discrimination and the inability to perform consistently at work due to health flare-ups [43].

Given the complex challenges associated with sickle cell anemia, psychosocial support is crucial for improving a patient's quality of life. This support encompasses various forms of assistance, including mental health counseling, social services, peer support groups, and family education programs [44].

Mental health counseling is a vital component of psychosocial support. Individuals with SCA often experience anxiety, depression, and low self-esteem stemming from the disease's chronic nature and its impact on daily life. Mental health professionals can provide coping strategies, cognitive-behavioral therapy, and relaxation techniques that empower patients to manage their emotions and navigate the stressors associated with their illness. Regular therapy sessions can help patients articulate their needs, leading to constructive emotional outlets and improved psychological well-being [45].

Social services play an integral role in providing comprehensive support systems for individuals with SCA. This can involve assistance in navigating healthcare systems, accessing financial aid, and obtaining educational accommodations. Advocacy for patients is essential to ensure their rights are upheld, especially when it comes to access to quality care and support from educational institutions and workplaces. Social workers can help identify resources available to patients and their families, guiding them through the complexities of managing their health care and daily life [46].

Peer support groups create a safe space for individuals with sickle cell anemia to share experiences, challenges, and coping strategies. Connecting with others who understand the nuances of living with this condition can alleviate feelings of isolation and loneliness. These groups foster a sense of community, empowering individuals to build resilience and develop healthier coping mechanisms. Patients may also find comfort in hearing strategies that others employ to manage pain or maintain a positive outlook, which can be instrumental in face of adversity [47].

Education for family members is another crucial aspect of psychosocial support. Family dynamics often shift when one member is chronically ill, and caregivers may struggle with their own psychological stress as they try to support an individual with SCA. Programs that educate families about the disease, its implications, and effective communication strategies can significantly improve the home environment and strengthen family bonds. Informed family members are better equipped to provide emotional support, facilitate medical care, and advocate for their loved one's needs [48].

The combination of psychosocial support initiatives has demonstrated a remarkable potential to improve the quality of life for individuals living with sickle cell anemia. While the physical symptoms of the disease are often the primary focus of medical care, mental health and well-being are equally important. Support that encompasses emotional and psychological care leads not only to improved mental health outcomes but also to better management of physical symptoms [49].

Research indicates that patients receiving comprehensive psychosocial support exhibit increased levels of self-efficacy, reduced anxiety and depressive symptoms, and improved overall satisfaction with life. Enhanced coping skills allow individuals to actively engage in their healthcare, adhere to treatment plans, and manage their pain more effectively. Furthermore, a supportive social network provides resilience during times of crisis, making it easier for patients to overcome challenges [50].

Collaborative Interdisciplinary Care:

Sickle cell disease (SCD) is a complex and debilitating genetic disorder characterized by the production of abnormal hemoglobin, leading to distorted red blood cells that can cause various health complications. These complications result in severe pain crises, increased susceptibility to infections, organ damage, and a risk of stroke among other issues. The management of SCD requires an intricate approach that encompasses not only pharmacological interventions but also holistic care strategies. As the healthcare landscape evolves toward more integrated and patient-centered models, multidisciplinary collaborative care has emerged as a promising paradigm for the effective management of SCD [51].

To appreciate the need for a collaborative approach, it is essential to understand the nature of sickle cell disease. SCD arises from a mutation in the hemoglobin gene (HBB) that causes the production of sickle-shaped red blood cells. These abnormal red blood cells can clump together, obstruct blood flow, and lead to painful vaso-occlusive crises. Patients experience episodes of acute pain, chronic pain, increased risk of infections, and a range of other complications affecting organs such as the spleen, liver, and kidneys. The implications of these challenges extend beyond physical health, affecting the psychological, social, and economic well-being of patients. Consequently, a multifaceted approach to care is necessary, integrating expertise from various disciplines to address the diverse needs of these patients [52].

The Multidisciplinary Care Team

Multidisciplinary collaborative care involves a coordinated effort among healthcare professionals from diverse specializations, aiming to address the comprehensive needs of patients. In the context of SCD, the collaborative care team typically includes:

1. **Hematologists:** Specialists in blood disorders who play a key role in the diagnosis, monitoring, and treatment of SCD. They manage pain episodes, recommend transfusions, and prescribe disease-modifying therapies such as hydroxyurea [53].
2. **Nurses:** Especially those with expertise in hematology and sickle cell care, nurses provide essential education on disease management, pain assessment, and coordination of care among specialists [53].
3. **Primary Care Physicians:** These professionals oversee the general health of the patient, managing comorbid conditions and ensuring continuity of care [53].
4. **Psychologists/Psychiatrists:** Mental health professionals who provide counseling and support to help patients manage pain and cope with the psychological burden of living with a chronic illness.
5. **Social Workers:** They support families by connecting them with community resources, providing counseling services, and assisting with issues related to health insurance and access to care [53].
6. **Nutritionists/Dietitians:** Experts who offer dietary guidance essential for reducing the risk of complications and improving overall health.
7. **Pain Management Specialists:** Professionals specializing in pain assessment and interventions to provide relief during painful crises [53].
8. **Physiotherapists and Occupational Therapists:** These therapists aid in reinforcing mobility and promoting activities of daily living, focusing on maintaining functional independence [53].

Benefits of Multidisciplinary Collaborative Care

The collaborative care model offers numerous advantages for managing sickle cell disease:

1. **Comprehensive Care:** Addressing the myriad of symptoms and complications associated with SCD requires a comprehensive assessment. A collaborative team can ensure that all aspects of a patient's health are focused on [54].
2. **Holistic Approach:** By incorporating mental health, social services, and lifestyle management into the treatment plan, this approach supports the patient's emotional and psychosocial wellbeing in addition to their physical health.
3. **Reduced Healthcare Costs:** Effective management reduces the frequency of emergency room visits and hospitalizations through proactive care, resulting in long-term cost savings for families and healthcare systems [54].
4. **Improved Patient Education and Self-Management:** Collaborative care teams create educational opportunities that empower patients to take an active role in managing their disease. Knowledge of triggers for pain crises and strategies for managing symptoms helps improve patient outcomes.
5. **Enhanced Communication:** Multidisciplinary teams facilitate improved communication between healthcare providers, leading to more cohesive care plans and timely interventions [54].

Challenges in Implementing Collaborative Care

While the benefits of a multidisciplinary approach are evident, implementation faces several challenges:

1. **Coordination and Integration:** Effective communication among team members is essential, but varying schedules, differing institutional priorities, and fragmentation in the healthcare delivery system can hinder coordination efforts [55].
2. **Resource Limitations:** Not all healthcare facilities may have the same access to specialists or resources necessary to build a multidisciplinary team, particularly in underserved areas [55].
3. **Training and Awareness:** Healthcare professionals must be adequately trained to work as part of a collaborative team, fostering an environment of respect and shared decision-making. This can be resource-intensive and not universally available [56].

4. **Patient Engagement:** Ensuring patient involvement in their care can be challenging. Some patients may feel overwhelmed by the complexities of their care team or may not understand their role within the multidisciplinary structure [57].
5. **Cultural Competence:** Patients come from diverse backgrounds, and members of the care team must be culturally competent and sensitive to the social determinants of health that affect their patient population [57].

Conclusion:

In conclusion, nursing care for patients with sickle cell disease (SCD) is a multifaceted approach that requires a deep understanding of the condition's complexities and its impact on the lives of affected individuals. Nurses play a vital role in assessing and managing pain, preventing complications, and providing education that empowers patients to take an active role in their care. By implementing evidence-based practices and collaborating with a multidisciplinary team, nurses can effectively enhance patient outcomes and improve quality of life.

Furthermore, addressing the psychosocial aspects of living with SCD is essential for providing holistic care. Emotional support and resources should be incorporated into nursing practice to help patients navigate the challenges associated with this chronic condition. As the healthcare landscape continues to evolve, ongoing education and advocacy for patients with SCD will ensure that they receive comprehensive care tailored to their unique needs, ultimately fostering a better understanding of the disease and improving care strategies.

References:

1. Buchanan G, Vichinsky E, Krishnamurti L, Shenoy S. Severe sickle cell disease—Pathophysiology and therapy. *Biology of Blood and Marrow Transplantation*. 2010;16:S64–S67. doi: 10.1016/j.bbmt.2009.10.001.
2. Ballas SK. Update on pain management in sickle cell disease. *Hemoglobin*. 2011;35:520–529. doi: 10.3109/03630269.2011.610478.
3. Dunlop RJ, Bennett KC. Pain management for sickle cell disease. *Cochrane Database of Systematic Reviews*. 2006;2:CD003350. doi: 10.1002/14651858.CD003350.pub2.
4. Brousse V, Makani J, Rees DC. Management of sickle cell disease in the community. *BMJ*. 2014;348:g1765. doi: 10.1136/bmj.g1765.
5. Agency for Healthcare Research and Quality. Outpatient case management for adults with medical illness and complex care needs. 2013.
6. Ataga KI. Novel therapies in sickle cell disease. *Hematology/Education Program of the American Society of Hematology*. 2009;1:54–61. doi: 10.1182/asheducation-2009.1.54.
7. Howard J, Oteng-Ntim E. The obstetric management of sickle cell disease. *Best Practice and Research. Clinical Obstetrics and Gynaecology*. 2012;26:25–36. doi: 10.1016/j.bpobgyn.2011.10.001.
8. Houston-Yu P, Rana SR, Beyer B, Castro O. Frequent and prolonged hospitalizations: A risk factor for early mortality in sickle cell disease patients. *American Journal of Hematology*. 2003;72:201–203. doi: 10.1002/ajh.10305.
9. Darbari DS, Ballas SK, Clauw DJ. Thinking beyond sickling to better understand pain in sickle cell disease. *European Journal of Haematology*. 2014;93:89–95. doi: 10.1111/ejh.12340.
10. Doss S, DePascal P, Hadley K. Patient-nurse partnerships. *Nephrology Nursing Journal*. 2011;38:115–124.
11. Gregory TB. Chronic pain perspectives: Sickle cell disease: Gaining control over the pain. *Journal of Family Practice*. 2012;61(Suppl):S5–S8.
12. Drwecki BB, Moore CF, Ward SE, Prkachin KM. Reducing racial disparities in pain treatment: The role of empathy and perspective-taking. *Pain*. 2011;152:1001–1006. doi: 10.1016/j.pain.2010.12.005.
13. Centers for Disease Control and Prevention. Facts about sickle cell disease. 2014a.
14. Centers for Disease Control and Prevention. Newborn screening. 2014b.
15. Centers for Disease Control and Prevention. Data and statistics. 2011.
16. Centers for Disease Control and Prevention. Sickle cell disease and pregnancy. 2014c.
17. Ballas SK, Gupta K, Adams-Graves P. Sickle cell pain: A critical reappraisal. *Blood*. 2012;120:3647–3656. doi: 10.1182/blood-2012-04-383430.
18. Higgins NC, Bailey SJ, LaChapelle DL, Harman K, Hadjistavropoulos T. Coping styles, pain expressiveness, and implicit theories of chronic pain. *Journal of Psychology*. 2015;149:737–750. doi: 10.1080/00223980.2014.977759.
19. Ballas SK, Kesen MR, Goldberg MF, Luty GA, Dampier C, Osunkwo I, ... Malik P. Beyond the definitions of the phenotypic complications of sickle cell disease: An update on management. *Scientific World Journal*. 2012. doi: 10.1100/2012/949535.
20. Genetics Home Reference. Sickle cell disease. 2012.

21. Jacob E. Pain management in sickle cell disease. *Pain Management Nursing*. 2001;2:121–131. doi: 10.1053/jpmn.2001.26297.
22. Jenerette C, Brewer C. Health-related stigma in young adults with sickle cell disease. *Journal of the National Medical Association*. 2010;102:1050–1055. doi: 10.1016/s0027-9684(15)30732-x.
23. Diggs LW. The crisis in sickle cell anemia: Hematologic studies. *American Journal of Clinical Pathology*. 1956;26(10):1109–1118. doi: 10.1093/ajcp/26.10.1109.
24. Ratanawongsa N, Haywood C, Bediako S, Lattimer L, Lanzkron S, Hill P, et al. Beach M. Health care provider attitudes toward patients with acute vaso-occlusive crisis due to sickle cell disease: Development of a scale. *Patient Education and Counseling*. 2009;76:272–278. doi: 10.1016/j.pec.2009.01.007.
25. Haywood C, Lanzkron S, Hughes M, Brown R, Massa M, Ratanawongsa N, Beach MC. A video- intervention to improve clinician attitudes toward patients with sickle cell disease: The results of a randomized experiment. *Journal of General Internal Medicine*. 2010;26:518–523. doi: 10.1007/s11606-010-1605-5.
26. Lattimer L, Haywood C, Lanzkron S, Ratanawongsa N, Bediako S, Beach M. Problematic hospital experiences among adult patients with sickle cell disease. *Journal of Health Care for the Poor and Underserved*. 2010;21:1114–1123. doi: 10.1353/hpu.2010.0940.
27. Pack-Mabien A, Haynes J. A primary care provider's guide to preventive and acute care management of adults and children with sickle cell disease. *American Academy of Nurse Practitioners*. 2009;21:250–257. doi: 10.1111/j.17457599.2009.00401.x.
28. Glassenberg JA, Tanabe P, Chow A, Harper K, Haywood C, DeBaun MR, Richardson LD. Emergency provider analgesic practices and attitudes toward patients with sickle cell disease. *Annals of Emergency Medicine*. 2013;62(4):293–302. doi: 10.1016/j.annemergmed.2013.02.004.
29. Jenerette C, Brewer C, Ataga K. Care seeking for pain in young adults with sickle cell disease. *Pain Management Nursing*. 2013;15(1):324–330. doi: 10.1016/j.pmn.2012.10.007.
30. Creary M, Williamson D, Kulkarni R. Sickle cell disease: Current activities, public health implications and future directions. *Journal of Women's Health*. 2007;16:575–582. doi: 10.1089/jwh.2007.CDC4.
31. Howard J, Oteng-Ntim E. The obstetric management of sickle cell disease. *Best Practice & Research Clinical Obstetrics and Gynaecology*. 2012;26:25–36. doi: 10.1016/j.bpobgyn.2011.10.001.
32. Jenerette C, Brewer CA, Crandell J, Ataga KI. Preliminary validity and reliability of the sickle cell disease health-related stigma scale. *Issues in Mental Health Nursing*. 2012;33(6):363–369. doi: 10.3109/01612840.2012.656823.
33. Khattab A, Rawlings B, Ali I. Haemoglobinopathies and healthcare provision for ethnic minorities. *British Journal of Nursing*. 2005;14:824–827. doi: 10.12968/bjon.2005.14.15.18601.
34. Ballas S. Update on pain management in sickle cell disease. *Hemoglobin*. 2011;35:520–529. doi: 10.3109/03630269.2011.610478.
35. McCaffery M. *Nursing practice theories related to cognition, bodily pain, and man-environment interactions*. Los Angeles: University of California at Los Angeles Students' Store; 1968.
36. Pack-Mabien A, Labbe E, Herbert D, Haynes J. Nurses' attitudes and practices in sickle cell pain management. *Applied Nursing Research*. 2001;14:187–192. doi: 10.1053/apnr.2001.26783.
37. Jenerette C, Brewer C, Moura V. Teachable moment: Breathing exercises for inpatients with sickle cell disease. *MedSurg Nursing*. in press.
38. Ballas S, Gupta K, Adams-Graves P. Sickle cell pain: A critical reappraisal. *Blood*. 2012;120(18):3647–3656. doi: 10.1182/blood-2012-04-383430.
39. Haywood C, Lanzkron S, Ratanawongsa N, Beach M. Problematic hospital experiences among adult patients with sickle cell disease. *Journal of Health Care for the Poor and Underserved*. 2010;21:1114–1123. doi: 10.1353/hpu.2010.0940.
40. Jenerette C, Brewer C, Ataga K. Care seeking for pain in young adults with sickle cell disease. *Pain Management Nursing*. 2013;15(1):324–330. doi: 10.1016/j.pmn.2012.10.007.
41. Aisiku IP, Smith WR, McClish DK, Levenson JL, Penberthy LT, Roseff SD, Roberts JD. Comparisons of high versus low emergency department utilizers in sickle cell disease. *Annals of Emergency Medicine*. 2009;53(5):587–593. doi: 10.1016/j.annemergmed.2008.07.050.
42. Cakir B, Katsounis S, K DJ, Kopf S, Steiner J. Hospital Readmissions from Patients' Perspectives. *Southern Medical Journal*. 2017;110(5):353–358. doi: 10.14423/SMJ.0000000000000646.
43. Elmariah H, Garrett ME, De Castro LM, Jonassaint JC, Ataga KI, Eckman JR, Telen MJ. Factors associated with survival in a contemporary adult sickle cell disease cohort. *American Journal of Hematology*. 2014;89(5):530–535. doi: 10.1002/ajh.23683.

44. Freiermuth CE, Silva S, Cline DM, Tanabe P. Shift in Emergency Department Provider Attitudes Toward Patients With Sickle Cell Disease. *Advanced Emergency Nursing Journal*. 2016;38(3):199–212. doi: 10.1097/TME.0000000000000106.
45. Haywood C, Jr, Beach MC, Lanzkron S, Strouse JJ, Wilson R, Park H, Segal JB. A systematic review of barriers and interventions to improve appropriate use of therapies for sickle cell disease. *Journal of the National Medical Association*. 2009;101(10):1022–1033. doi: 10.1016/s0027-9684(15)31069-5.
46. Booker MJ, Blethyn KL, Wright CJ, Greenfield SM. Pain management in sickle cell disease. *Chronic Illness*. 2006;2(1):39–50. doi: 10.1179/174592006x93860.
47. Brown SE, Weisberg DF, Balf-Soran G, Sledge WH. Sickle cell disease patients with and without extremely high hospital use: pain, opioids, and coping. *Journal of Pain and Symptom Management*. 2015;49(3):539–547. doi: 10.1016/j.jpainsymman.2014.06.007.
48. Hassell KL. Population estimates of sickle cell disease in the U.S. *American Journal of Preventive Medicine*. 2010;38(4 Suppl):S512–521. doi: 10.1016/j.amepre.2009.12.022.
49. Hall WJ, Chapman MV, Lee KM, Merino YM, Thomas TW, Payne BK, Coyne-Beasley T. Implicit Racial/Ethnic Bias Among Health Care Professionals and Its Influence on Health Care Outcomes: A Systematic Review. *American Journal of Public Health*. 2015;105(12):e60–76. doi: 10.2105/ajph.2015.302903.
50. Adegbola MA, Barnes DM, Opollo JG, Herr K, Gray J, McCarthy AM. Voices of Adults Living with Sickle Cell Disease Pain. *Journal of National Black Nurses Association*. 2012;23(2):16–23.
51. Hanik M, Sackett KM, Hartman LL. An educational module to improve healthcare staffs' attitudes toward sickle cell disease patients. *J Nurses Prof Dev*. 2014;30(5):231–236. doi: 10.1097/NND.0000000000000058.
52. FitzGerald C, Hurst S. Implicit bias in healthcare professionals: a systematic review. *BMC Medical Ethics*. 2017;18(1):19. doi: 10.1186/s12910-017-0179-8.
53. Glassberg JA, Tanabe P, Chow A, Harper K, Haywood C, Jr, DeBaun MR, Richardson LD. Emergency provider analgesic practices and attitudes toward patients with sickle cell disease. *Annals of Emergency Medicine*. 2013;62(4):293–302 e210. doi: 10.1016/j.annemergmed.2013.02.004.
54. Brodsky MA, Rodeghier M, Sanger M, Byrd J, McClain B, Covert B, Kassim AA. Risk Factors for 30-Day Readmission in Adults with Sickle Cell Disease. *American Journal of Medicine*. 2017;130(5):601 e609– 601 e615. doi: 10.1016/j.amjmed.2016.12.010.
55. Haywood C, Jr, Tanabe P, Naik R, Beach MC, Lanzkron S. The impact of race and disease on sickle cell patient wait times in the emergency department. *American Journal of Emergency Medicine*. 2013;31(4):651–656. doi: 10.1016/j.ajem.2012.11.005.
56. Haywood C, Jr, Bediako S, Lanzkron S, Diener-West M, Strouse J, Haythornthwaite J. An unequal burden: poor patient-provider communication and sickle cell disease. *Patient Education and Counseling*. 2014;96(2):159–164. doi: 10.1016/j.pec.2014.05.013.
57. Freiermuth CE, Haywood C, Jr, Silva S, Cline DM, Kayle M, Sullivan D, Tanabe P. Attitudes toward patients with sickle cell disease in a multicenter sample of emergency department providers. *Advanced Emergency Nursing Journal*. 2014;36(4):335–347. doi: 10.1097/TME.0000000000000036.