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HEALTH CARE UTILIZATION AND ITS DETERMINANTS AMONG SICKLE CELL DISEASE PATIENTS ATTENDING OUTPATIENT CLINIC AT USMANU DANFODIYO UNIVERSITY TEACHING HOSPITAL SOKOTO

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Abstract

Background: Sickle Cell Disease (SCD) is associated with high utilization of healthcare services owing to the multitude of medical and surgical complications as well as comorbidities linked to the condition, which place a significant financial burden on healthcare resources, particularly due to recurrent episodes of vaso-occlusive crisis.

Aim: To determine the health care utilization and its determinants among sickle cell disease patients attending outpatient clinic at Usmanu Danfodiyo University Teaching Hospital Sokoto. (UDUTH)

Materials and Methods: The study was conducted at UDUTH in Sokoto and involved the use of sociodemographic, clinical, and healthcare utilization (HCU) questionnaires.

Results: The rate of hospitalization was 1.51 standard deviations (SD) ± 2.31 days, while the number of days hospitalized was 10.89 SD ± 23.96 days per year. Emergency care visits transpired at a rate of 1.39 SD ± 2.83 days per year., while Day Care Visits averaged 4.82 SD ± 7.98 days per year. Marital status (p=0.009) and level of education (p=0.036) were significantly associated with high HCU. Level of education was a statistically significant predictor (p=0.019).

Conclusion: The findings indicated high healthcare utilization among the SCD patients. Furthermore, the researchers identified low level of education as a significant determinant of high healthcare utilization within this patient cohort.

Keywords: Health Care Utilization, Health Care, Sickle cell disease

INTRODUCTION

Sickle cell disease (SCD) is the most prevalent inherited blood disorder globally, primarily impacting individuals of African and Hispanic Caribbean ancestry.(1, 2) Patients with SCD have one of the highest 30-day hospital readmission rates, exceeding 30%, which reflects the severity of their condition and potentially preventable healthcare utilization.(1) Healthcare utilization is defined as the usage of healthcare services by people and people's use of healthcare is influenced by availability, service quality, socioeconomic level, and personal characteristics.(3) Sickle cell disease is linked to a high use of medical resources and significant medical costs, advances in medical care have contributed to increasing survival rates , with considerable financial strain on healthcare resources.(4) Pain management is the most controversial and difficult of SCD care.(5) The failure to acquire effective pain control during a vaso-occlusive crisis (VOC) which is the hallmark of SCD is one of the most common causes of increased health care utilization through frequent hospitalization.(1, 2, 6) Sub-Saharan Africa exhibits the highest prevalence of SCD, and the healthcare system bears its own share of the burden. For instance, according to reports, the Komfo Anokye Teaching Hospital in Kumasi, Ghana, is currently providing care for 6,000 newborns with sickle cell disease, representing the largest number of newborns receiving care for this hematological disorder in a single location worldwide.(7, 8) In Nigeria, SCD patients have been found to exhibit high levels of healthcare utilization, as evidenced by a hospital admission rate of 120.7% in 1988, with many patients experiencing multiple admissions. Hospital stays ranged from 3 to 35 days, and 90% of the subjects received blood transfusions, averaging 1.23 units per patient.(9) Eugenia and her colleagues' retrospective two-year chart review in Ghana revealed increased healthcare utilization among SCD patients, with approximately one-fifth making more than 12 clinic visits annually, predominantly those with the HbSS phenotype, influenced by the Ghanaian climate, peaking in January and declining during December festivities, with outpatient appointments comprising 76%, urgent care visits 24%, admissions 2.6%, and 16% referred for specialist care.(10) In developing nations, providing well-organized holistic care can considerably reduce morbidity and mortality while also improving the quality of life for persons living with HbSS .(7)

METHOD

Individuals diagnosed with SCD were recruited during there outpatient visits to the Medical Outpatients Department of the Usmanu Danfodiyo University Teaching Hospital (UDUTH) in Sokoto, Nigeria. The data collection was conducted over a 6-months period (December 2022 to May 2023), during which 206 participants provided informed consent to participate in the institutional review board-approved study (UDUTH/HREC/2022/1151/V2).

SAMPLE SIZE DETERMINATION

This study was part of a larger study that determined the prevalence of depression among SCD patients at UDUTH Sokoto, therefore, the prevalence of depression from previous study was used to estimate the optimal sample size. A study of 205 stable adult out-patients at a treatment center in southern Nigeria found that the prevalence of current depression was 16.6%.

Using the formula:

$n = z2pq/d2$.

The sample size will be determined using the formula (z2 pq/d2)

n = minimum sample size.

z = standard normal deviation and probability.

p = prevalence or proportion of value to be estimated from

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previous studies.
q = Proportion of failure (=1 − P).
d = precision, tolerance limit, the minimum is 0.05.
Therefore, n = z2pq/d2.

Where, Z = 95% (1.96).
P = 16.6% (0.166)
q = 1 – 0.166 (=0.834).
d = 5% (0.05).
Therefore, n = (1.96)2(0.166) (0.834)/(0.05)2.
n =212.74. Approximately=213
The estimated target population was less than 10,000 in a year. The estimated SCD population of patients seen at MOPD in a calendar year was about 1380.

$$nf = \frac{n}{1+n/N}$$

n = minimum sample size
nf=Adjusted minimum sample size
N=Target population in a year

$$nf = \frac{n}{1+n/N}$$

nf = estimated sample
N =expected participant in one year =1380

$$nf = \frac{213}{1+213/1380}$$

$$nf = 213$$

$$nf = \frac{213}{1.15}$$

$$nf = 185$$

Adjustment is made to increase the sample size to account for anticipated number of non-response or filled questionnaires that could not be analysed.

The formula for calculating adjusted sample size: $N = \frac{n}{1-q}$.

Where N is adjusted sample size
n is the calculated sample size
q is the proportion of expected non response which is 10% percent (0.1)
Therefore,

$$N = \frac{185}{1-0.1}$$

$$N = \frac{185}{0.9}$$

N = 205.5 Approximately, N = 206 Rounded up to 210; therefore, 210 were recruited for the study.

All participants were 18 years of age or older and had a clinical diagnosis of SCD, including both homozygous and heterozygous forms. Exclusion criteria involved the presence of severe mental or general medical conditions that would significantly impede participation, as well as the unwillingness or inability to engage in the study.

PROCEDURE

A semi-structured questionnaire was designed by the researchers and used to collect data on socio-demographic and clinical variables, as well as healthcare utilization. Healthcare utilization was assessed within the past 12 months or, if less than 12 months, from the time of diagnosis. It included visits to primary care physicians, daycare, emergency departments, other hospitals, specialty clinics (including hematology and other specialists like neurology and orthopedics), radiological investigations, laboratory tests, hospitalizations, days hospitalized, days given excused duty, inability to go to work, medications prescribed, uses of complementary services, telephone consultations, blood transfusions, and purchases of over-the-counter medication. Healthcare utilization variables were categorized into high (75th percentile and above) and low (below 75th percentile) groups. For some variables, the 75th percentile was zero, so any usage of one or more was considered high utilization. Participants were divided into high and low health care utilizers based on their scores across 15 utilization variables. Those scoring 8 or above were classified as high utilizers, while those scoring below 7 were low utilizers. The categorization was determined by assigning 1 point for each utilization variable above the 75th percentile, and 0 points for those below.

STATISTICAL ANALYSIS

The analysis was conducted using Statistical Product and Service Solution version 25. Chi-square ($\chi 2$) and Fisher's exact statistics were used to test for associations at p-values less than 0.05. Binary Logistic regression was used to investigate the determinants of HCU. The marital status and level of education were the variables included in the logistic regression analysis.

RESULTS

Health Care Utilization among Sickle Cell Disease Patients

The rate of hospitalization among the SCD (sickle cell disease) participants was 1.51 standard deviations (SD) ± 2.31 days, while the number of days hospitalized was 10.89 SD ± 23.96 days. Emergency care visits transpired at a rate of 1.39 SD ± 2.83 days, whereas Day Care Visits averaged 4.82±7.98 days. Additional health care utilization metrics are delineated in the data presented in Table 1 below.

Table 1: Rate of Health Care Utilization among SCD Patients

Variable	*Rate*
Number of Hospitalization	*1.51 SD± 2.31*
Number of Days Hospitalized	*10.89 SD±23.96*
Number of Emergency Care Visits	*1.39 SD± 2.83*
Number of Day Care Visits	*4.82 SD ± 7.98*
Number of Visits to Primary Care Physician	*0.58 SD ±2.5*
Number of Visits to Specialist Care Clinic	*15.52 SD ±14.14*
Number of Laboratory Tests	*39.50 SD± 30.31*
Number of Radiology Tests	*1.05 SD± 2.03*
Number of Other Hospital Visits	*0.28 SD± 0.89*
Number of Days Given excuse Duty or Inability to Work	*56.16 SD± 48.54*
Number of medications Prescribed	*12.34 SD± 6.65*
Number of Alternative or Complementary Services	*1.28 SD± 3.85*
Number of Telephone Consultation	*1.49 SD± 4.50*
Number of times Purchased Over the Counter Medication	*4.95 SD±15.49*
Number of Blood Transfusion	*1.48 SD± 3.21*

Table 2: Socio-demographic Characteristics and Overall, Health Care Utilization

Variable	*Low HCU (%)*	*High HCU (%)*	χ^2	*Df*	*p -value*
Age CAT (years)					
18-28	*92.8*	*7.2*	*		*0.340*
29-38	*84.0*	*16.0*			
39-48	*100.0*	*0.0*			
59-68	*100.0*	*0.0*			
Gender					
Male	*93.7*	*6.3*	*0.370*		*0.604*
Female	*91.3*	*8.7*			
Marital status					
Single	*88.7*	*11.3*	*		***0.009***
Married	*100.0*	*0.0*			
Divorced	*100.0*	*0.0*			
Tribe					
Hausa	*92.1*	*7.9*	*		*0.410*
Yoruba	*100.0*	*0.0*			
Igbo	*66.7*	*33.3*			
Others	*100.0*	*0.0*			
Religion					
Islam	*92.3*	*7.7*	*		*0.599*
Christianity	*90.9*	*9.1*			
Socioeconomic status					
Low	*90.9/*	*9.1*	*3.194*	*2*	*0.226*
Medium	*90.7*	*9.3*			
High	*100.0*	*0.0*			
Employment					
Employed	*92.0*	*8.0*	*		*0.932*
Unemployed	*91.6*	*8.4*			
Student	*93.5*	*6.5*			
Level of education					
Secondary and below	*96.2*	*3.8*	*4.861*		***0.036***
Tertiary	*88.0*	*12.0*			
Social support					
Poor to Moderate	*91.4*	*8.6*	*		*0.739*
Good	*92.4*	*7.6*			
Family Type					
Monogamous	*94.4*	*5.6*	*1.010*	*1*	*0.433*
Polygamous	*90.6*	*9.4*			
Insurance Coverage					
Yes	*91.5*	*8.5*	*		*0.764*
No	*92.5*	*7.5*			
Haemoglobin Type					
HBSS	*92.4*	*7.6*	*		*0.682*
HBSC	*90.9*	*9.1*			
Hydroxy Urea use					
Yes	*88.1*	*11.9*	*2.414*	*1*	*0.163*
No	*94.2*	*5.8*			
Body mass index					
Normal	*92.5*	*7.5*	*		*0.335*
Over weight	*80.0*	*20.0*			
Steady state PCV (24.0±4.7)					
<24	*90.4*	*9.6*	*0.788*	*1*	*0.438*
≥24	*93.8*	*6.2*			
Comorbidity					
Yes	*92.6*	*7.4*	*0.039*	*1*	*1.000*
No	*91.9*	*8.1*			

DISCUSSION

Our study shows high rate of health care utilization is commensurate with increase work absenteeism, laboratory tests, and visit to specialist as seen in table. These signifies the high indirect cost associated with SCD. On the other hand, high rate of health care utilization was found to be associated with frequency of hospitalization, use of emergency care, visits to primary care physician, as well as other hospital visits.

Many persons with sickle cell disease (SCD) are able to manage their pain at home and do not require frequent hospitalization. The healthcare utilization patterns for this population are uneven. Patients with more severe forms of SCD, such as those experiencing more complications from the disease, tend to have the highest levels of healthcare utilization and incur the greatest healthcare costs.(1) Brousseau, from the United States, reported the rate of hospitalization to be similar to the findings from this study, which is about one and a half times per patient.

However, the treatment and release that corresponds to the day care services in our study area (hospital) were about four times less than what was found in our study. The difference may be a result of the fact that our study was conducted in the hospital, where patients with more severe cases were present for day care, as opposed to Brousseau, whose study involved community participants.(14) The average length of hospital stay in our study was higher than what was found by Rodday and colleagues. This difference may be due to the fact that our study included only HbSS and HbSC genotypes, while Rodday's study included all SCD genotypes such as Hb Sβ+ thalassemia, Hb Sβ0 thalassemia, and other/unspecified types. Additionally, our study considered all hospital admissions for any SCD complication, not just those for vaso-occlusive crisis (VOC), as was the case in Rodday's study.(1)

Complementary and Alternative Medicine (CAM) is defined by the National Centre for Complementary and Alternative Medicine (NCCAM) as a collection of various medical and healthcare systems, procedures, and goods that aren't typically regarded as belonging to traditional medicine.(2) The use of CAM has been reported among individuals with sickle cell disease.(2, 15-17) In a similar fashion, the use of CAM as a source of relief for SCD was also practiced by the participants in this index study, with the average consultation to CAM being above one and a half times per study participant. Busari from Lagos reported that 88.5% of his participants had used CAM.(16) Additionally, a systematic review by Alsabri that involved twenty-four studies found that the prevalence of CAM use in pediatric patients with SCD ranged from 36 to 84.5% and the common CAM interventions included yoga, virtual reality, cognitive behavioral therapy, massage therapy, guided-imagery, and acupuncture, which were found to decrease pain scale scores.(17)

Lack of access to care is a major factor in poor quality of care and unfavourable health outcomes for those with SCD.(18) Telemedicine has proven to be an effective therapeutic strategy for people with SCD, as more accessibility through telemedicine is possible for a population of patients who face multiple obstacles to receiving care.(19) Participants in the current study also realize the benefits of telemedicine and engage in telephone consultations, with an average of at least one consultation in the last 12 months. SCD patients found it important to have the option of either telemedicine or in-person visits to access specialized care, as they valued the benefits of telemedicine but still felt the need for in-person consultations with their doctor at times, particularly when physical examinations were required. Despite the advantages of telemedicine, participants wanted to maintain the ability to have in-person visits when needed due to their SCD.(19)

CONCLUSION

The utilization of healthcare services among individuals with SCD is notably high, and this extends beyond conventional orthodox care to encompass engagement in complementary and alternative medicine approaches. Similarly, telemedicine has emerged as a prevalent modality employed by SCD patients as a means of accessing care. Some of the sociodemographic factors identified as being associated with high healthcare utilization include marital status and level of education. Early investigations and prompt care, especially for VOC, should be a priority to reduce high levels of healthcare utilization. This is particularly important in sub-Saharan Africa, where the disease is endemic and healthcare resources, including personnel, are limited.

LIMITATION

The research was conducted in hospital settings, thus limiting the generalizability of the findings to the broader public. Additionally, the nature of the data collection, wherein participants were asked to recall their healthcare utilization behaviors over the preceding 12-month period, introduces the potential for recall bias.

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Conflict of Interest:The authors did not declare any conflicts of interest.

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