Hospitalization Events Among Sickle Cell Anemia Patients at Homabay County Referral Hospital, Western Kenya

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Abstract

Approximately 700,000 new cases of sickle-cell anemia (SCA) occur annually in the world with 60%-80% dying before their 5th year birthday. SCA patients often experience hospitalization events including admissions for pain and vaso-occlusive crisis, infections and blood transfusions. However, limited studies have evaluated these events to improve comprehensive care programs. A descriptive cross-sectional study design was adopted on 227 SCA patients receiving healthcare between January 2017 and December 2017 at Homabay County Referral Hospital, Western Kenya. A complete enumeration sampling technique was used, and data was collected from hospital medical records. A total of 167 (73.57%) SCA patients were admitted to the hospital, 64 (38.32%) had pain and vaso-occlusive crisis (PVC), 47 (28.14%) malaria infection and others had combination of infections or conditions. SCA patients with malaria had increased chance of admission (12.86% CI; 5.36-30.85%. P value <0.0001) and blood transfusions (11.67% CI; 5.27-25.82%, P value <0.0001). In addition, less than 20% were given drugs at the time of discharge suggesting unavailability of drugs. PVC is the leading cause of hospitalization and malaria infection prolong the period of admission and increases blood transfusions among SCA patients. The study provides important information on the need for improved care for PVC and enhanced malaria intervention among SCA patients.

Key words: SCA, Vaso-occlusive crisis**,** hospitalization events and blood transfusions

1. Introduction

Sickle cell anemia (SCA) is a genetic blood disorder affecting red blood cells, with high morbidity and mortality (WHO, 2016). The United Nations has recognized SCA as a global public health concern, and the World Health Organization (WHO) recommends that 50% of member states establish SCA control programs by 2020 (WHO, 2016). There has been the significant reduction in morbidity and mortality of children with SCA in high resource countries such as the United States (WHO, 2016). This is because of the improvement in early diagnosis through newborn screening programs, prophylactic therapy, comprehensive care programs including hydroxyurea therapy, and bone marrow transplant (WHO, 2016).

In sub-Saharan Africa, SCA is associated with a very high rate of childhood mortality, where 75% of the 300,000 global births of affected children live, (WHO, 2009) and estimates suggest that 50–80% of these patients will die before adulthood, (Makani, et al., 2011). In Africa, more than 200,000 infants are born yearly with SCA, (Makani, Williams, and Marsh, 2011).

In Iraq, (Zeina, Salman, and Meaad, 2015) established the main causes of hospitalization were acute painful crises (73.84%), infections (9.28%), acute chest syndrome (8.02%), and acute splenic sequestration crisis (6.32%) (Zeina, Salman, and Meaad, 2015). Research by (Brandow, Zappia, and Stucky, 2017) identified vaso-occlusive pain crisis as the most common reason for hospitalization among pediatric patients with sickle cell anemia. An acute sickle cell painful episode is the most common cause of hospitalization among SCA patients (Quarmyne, et al., 2017). The results from Thomas Jefferson University Hospital between January 1998 and December 2002 showed that about 50% of hospital admissions for acute painful episodes were readmitted within 1 month after discharge, and about 16% of all admissions were within 1 week after discharge. Causes of hospital readmission among these SCA patients included premature discharge, pain crisis, malaria, withdrawal syndrome, and recurrence of new acute episodes. This study therefore assessed hospitalization events, which included diagnosis at the time of admission, readmission and how malaria infection contributes to prolonged period of admission and blood transfusions in a poor resource setting.

2. Methods

2.1 Study Site

The study was conducted in Homabay County with a population of 963,794 (2009 Census). Located on the

Eastern shore of Lake Victoria in Western Kenya, it covers an area of 2586 Km2. There are 493 health facilities within the County with 51(10.3%) health facilities from Homabay Township (KDHIS, 2016). The predominant population is the Luo ethnic community, comprising largely a low social-economic status, subsistence-farming, and small-scale fishing community, have limited ability to access health facilities (Wycliffe, 2009).

2.2 Design

This study adopted a Cross-sectional descriptive research design utilizing quantitative approach of data collection. A check list was used to collect data on hospitalization events among sickle cell anemia patients between January 2017 to December 2017.

2.3 Study Participants

227 SCA patients seeking care at Homabay County Referral Hospital were recruited in the study. The primary outcome/dependent variable was the proportion of patients admitted to the hospital, period of admission and readmission rates. The complete enumeration was used where all the SCA patients seeking care at Homabay County Referral Hospital were selected for participation in the study. Ethical approval for the study was obtained from the Ethical Research Committee of Jaramogi Oginga Odinga Teaching and Referral Hospital in Kisumu County. Confidentiality and privacy were also maintained during data collection by using codes and not participants' names and ensuring that the mobile phones used during data collection were kept safe by creating a password for access of the information in the computer.

2.4 Data collection and analysis

Data sources included patient's medical files. A checklist was used to retrieve data from the patient's files. Quantitative data was collected using an open data kit (ODK) using mobile phones. Patient's medical files were reviewed with the help of research assistants with the supervision of the lead researcher. The data was then transferred into STATA version 14 for analysis. The variables were further categorized and descriptive statistical analysis including frequencies, means, range, and percentages was calculated. Inferential statistics including Odds ratio were also used to identify factors associated with hospitalization among SCA patients. All tests of significance were computed at $\alpha = 0.05$.

3. Results

A total of 227 SCA patient's medical records were reviewed and most of the patients 108 (47.58%) were under five years. However, three patients were 55, 65 and 73 years and more than half of the patients 122 (53.74%) were males while females only accounted for 105 (46.26%). The male patients were slightly older than their female with the mean age of 8.08 years and 5.40 years respectively. The minimum age recorded was 37 days while the maximum recorded age was 73 years.

3.1 The hospitalization events

Table 1 shows that 60 (26.43) of the patients had not been admitted to the hospital in the last one year. However, 167 (73.57%) of the SCA patients were admitted to the hospital with 98 (43.17%) admitted once, 16 (7.05%) twice and 53 (23.35%) admitted more than twice. In addition, the study shows that the main reason for admission in the past one year is Pain and vaso-occlusive Crisis; 64 (38.32%) followed by malaria; 47 (28.14%). Other reasons for admission were Bronchial Asthma; 7 (4.19%), Urinary Tract Infections (UTI) 7 (4.19%); Pneumonia; 4 (2.4%), Septicemia; 14 (8.38%), and others including impetigo, cardiac disease, diabetic mellitus, epilepsy, febrile convulsions and Rheumatoid heart disease; 24 (14.39%) (Table 1).

Table 1: Hospital Admission for Sickle Cell Anemia Patients

	Frequency, N=227	Percentages
Hospital admission in the past one year		
No admission	60	26.43
Once	98	43.17
Twice	16	7.05
More than twice	53	23.35
Reasons for admission in the past one year		
Pain and vaso-occlusive Crisis		
Malaria	64	38.32
Bronchial Asthma	47	28.14
Urinary Tract Infections (UTI)	7	4.19
Pneumonia	7	4.19
Septicemia	4	2.40
Others	14	8.38
Prescribed drugs in the last admission	24	14.39
Folate		
Palludrine	42	26.75
Given both drugs	36	22.93
Blood transfusions in the last 1 year, N=133	5	3.13
No transfusion		
Once	94	41.41
Twice	77	33.92
More than twice	34	14.98
	22	9.69

The drugs given to SCA patients during the last admission were folate and palludrine; 42 (26.75%) and 36 (22.93%) respectively. Also, 77 (33.92%) were transfused once while 34 (14.98%) were transfused twice. Only 22 (9.69%) of the patients who were transfused more than twice were admitted.

The major cause of readmission within one week of discharge of 69 (30.57%) of the SCA patients was a vaso-occlusive crisis; 54 (78.26%). Moreover, 7 (10.14%), 5 (7.25%) and 3 (4.35%) had been readmitted within one week of discharge due to malaria, convulsions, and Septic arthritis respectively, (Table 2). On the drugs given during last discharge, 26 (20.31%) had been given folate drugs during discharge while 16 (12.50%) were given palludrine. In addition, the study shows that 15 (21.74%) have been transfused once while 13 (18.84%) have been transfused twice. Also, 9 (13.04%) have been transfused more than twice. However, 32 (46.38%) have never been transfused before (Table 2).

Table 2: Re-admission events

	Frequency, N=227	Percentages
Hospital readmission within one week of discharge		
Yes	69	30.40
No	158	69.60
Reasons for hospital readmission within one week of Discharge (N=69)		
Vaso-occlusive crisis	54	78.26
Convulsions	5	7.25
Malaria	7	10.14
Septic arthritis	3	4.35
Blood transfusions during readmission		
No transfusion	32	46.38
Once	15	21.74
Twice	13	18.84
More than twice	9	13.04

When we treat single blood transfusion as “good outcome” and more than twice as "bad outcome" then we get that SCA patient with malaria infection 11.67% increased chance of blood transfusion with a CI of 5.27 to 25.82% and a highly significant P value < 0.0001.

3.2 Period of Admission

As shown in Figure 1, those who stayed in the hospital between 1-2 days were suffering from pain and vaso-occlusive crisis (41.77%) while 18.52% had malaria infection. For those who stayed for 3-6 days, 46.84% of them had pain and vaso-occlusive crisis and 31.48% malaria infection. In addition, 50% of the patients who stayed in the hospital for more than 6 days had malaria infection while 11.39% had pain and vaso-occlusive crisis. This finding indicates that those who had malaria stayed longer in the hospital compared to those who had pain and vaso-occlusive crisis ($p<0.0005$). The study further shows that 74.07% of SCA patients had malaria infection were transfused.

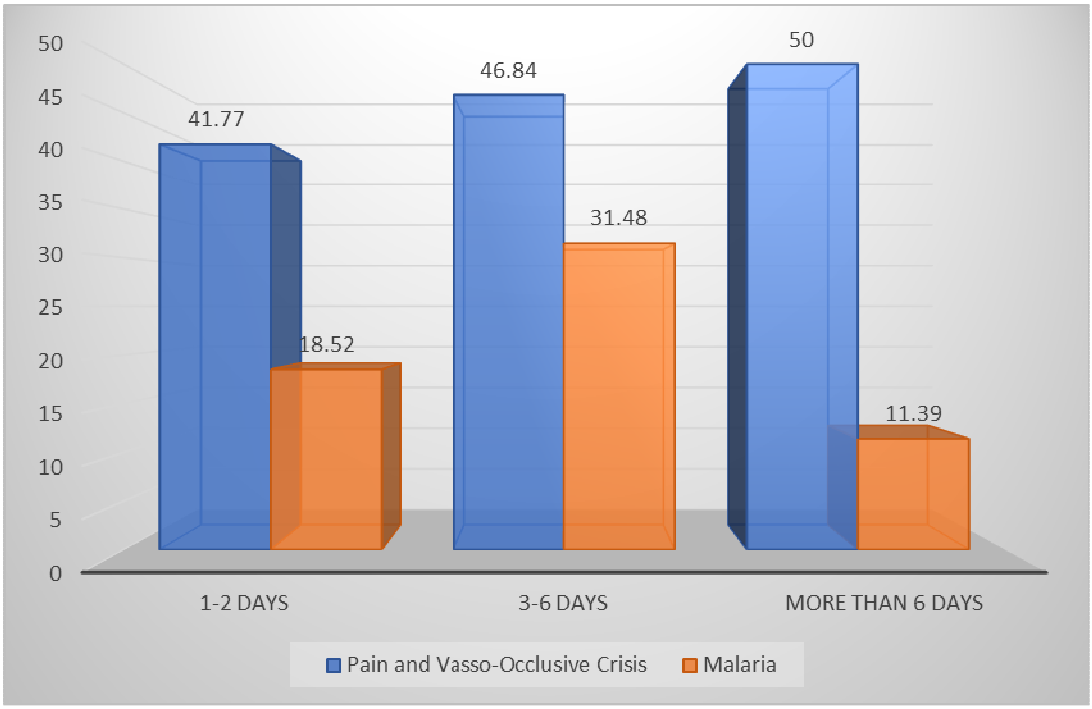

Figure 1: Period of admission among patients with Pain and vaso-occlusive crisis and malaria infection

4. Discussions

The study shows that pain and vaso-occlusive Crisis (38.32%) is main reason for admission in the past one year among SCA patients whereas a study by (Zeina, Salman, and Meaad, 2015) reported that PVC resulted into 73.84% admissions. The proportion shown by our study is low (38.32%) but nonetheless in agreement with other studies (Brandow, Zappia, and Stucky, 2017). The low number admitted in our study could be because our study population was older than other studies. We also reported that malaria infection 47 (28.14%) as a major cause of admission and other conditions such as Bronchial Asthma; 7 (4.19%), Urinary Tract Infections (UTI) 7 (4.19%); Pneumonia; 4 (2.4%), Septicemia; 14 (8.38%) etc.The main drugs given to SCA patients during the last admission were folate and palludrine. Unfortunately, 149 (65.64%) of the patients were not given these drugs. This suggest that in case of PVC, SCA patients will go to the hospital for treatment resulting into admission. Indeed, other studies have also reported inadequate drugs in health facilities (Benenson, Jadotte, and Echevarria, 2017). We report high hospitalization of SCA patients with frequent admissions, which is consistent with the report by Lennette, et al, (2010) who found out that frequent admission and prolonged hospitalizations are common among SCA patients.

The major cause of readmission within one week of discharge of 69 (30.57%) of the SCA patients was a vaso-occlusive crisis; 54 (78.26%). Moreover, 7 (10.14%), 5 (7.25%) and 3 (4.35%) had been readmitted within one week of discharge due to malaria, convulsions, and Septic arthritis respectively. The results are consistent to the findings by (Quarmyne, et al., 2017) that showed that about 50% of hospital admissions for acute painful episodes were readmitted within 1 month after discharge, and about 16% of all admissions were within 1 week after discharge. In addition, the study shows that 15 (21.74%) have been transfused once while 13 (18.84%) have been transfused twice. Also, 9 (13.04%) have been transfused more than twice. However, 32 (46.38%) have

never been transfused before. This finding is in agreement with the words echoed by (Sutton, 2017) that one of the requirements for pain management among SCA patients is a blood transfusion.The study established that most of the patients stayed in the hospital between 3-5 days; 54 (40.60%) followed by 43 (32.33%) who stayed in the hospital for a period of 1-2 days. The findings are contrasting the findings by (Lennette, et al., 2010) who found out that the length of stay (LOS) for inpatients is 1.5 days.

The condition affecting the patients influences LOS in the hospital. For instance, the results indicate that, those who had malaria stayed longer in the hospital compared to those who had pain and vaso-occlusive crisis; 27 (20.30%) stayed in the hospital for more than 6 days due to malaria compared to 9 (6.77%) of the SCA patients who had pain and vaso-occlusive crisis. This finding has not been explored by other studies. The findings show that the SCA patients who have been transfused once, 27 (20.30%) tend to stay more than 6 days in the hospital as compared to 4 (3.01%) who have been transfused more than twice. In addition, the number of patients who have been transfused more than twice; 7 (5.26%) and staying in the hospital between 3-5 days were fewer compared to 38 (28.57%) of the patients who have been transfused only once and stays in the hospital between 3-5 days. Moreover, SCA patients who were given folate, 21 (51.2%) and 17 (41.5%) stayed in the hospital for between 1-2 days and 3-5 days respectively. Additionally, a majority of the SCA patients; 14 (40.0%) and 13 (37.1%) who were given palludrine stayed in the hospital between 3-5 days and for more than 6 days respectively. This finding is supported by (Zeina et al., 2015); who found that the LOS for patients on hydroxyurea (days) was shorter than that for patients who were not (days) and that Patients on hydroxyurea were less likely to stay longer in the hospital. Although, hydroxyurea is a drug that has been recommended for SCA patients especially, during a crisis, only 4 (1.76%) were given hydroxyurea during discharge.

5. Conclusion

We report that PVC is the leading cause of hospitalization among SCA patients in Western Kenya, and malaria infection increases period of admission and blood transfusions. We consider the findings of study to be important for home-based care for PVC and enhanced intervention for malaria infection among SCA patients.

6. Acknowledgement

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