Prolonged Hospital Stay in Selected Tertiary Hospital in North-Western Kano State Nigeria: Retrospective Analysis of Predisposing Factors and Outcome

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ABSTRACT

Introduction: *Prolonged stay in either medical, surgical and accident/ orthopedic wards is defined ≥14 days stay in the wards and is associated with serious problem resulting in health associated infection, increased cost, and resource utilization. This study was aimed to determine prevalence and risk factors causing overstayed of patients in selected tertiary hospitals in Kano North western Nigeria.*

Materials and Methods: *This retrospective study was performed in three selected hospitals in Kano State. Data were obtained and analyzed. Others were duration of stay in 3 hospitals wards. The factors affecting of the prolonged stay in medical, surgical and orthopedic/ accident wards was evaluated in respect of qualified staff, staff training, equipment's in laboratory, theater and wards, quality assurance, availability of consumable and drugs.*

Results: *Indicated that the percentage of the prolonged stay in three hospitals was 40.34%, MMSH had the highest prolong stay (50.5%) and the least is MAWSH 28.91% of overall admissions. The mean age of the patients was 58 years, above 50 years of age,(27.7%) were the most having hospital stay. The percentage of the prolong hospital stay was high in accident/orthopedic(42.89%) and the least was Medical ward (21.69%) among all the patients were admitted due health associated infections. predictive factors for the prolonged stay were usage of equipment in cases of prolonged hospital stay (p=0.039, aOR; 0.25, 95% CI; 0.00-0.80), ; lack of qualified staff (p=0.030, aOR; 4.27, 95% CI; 2.78-7.68) and lacked training (p=0.017, aOR; 6.82, 95% CI; 5.01-9.83), presence of a quality assurance system (p=0.012, aOR; 0.56, 95% CI; 0.28-0.92) and availability of consumables and drug (p=0.026, aOR; 0.35, 95% CI; 0.01-0.62) in the three hospital wards.*

Conclusion: *Many reasons cause prolongation of hospital stay asuch as lack of qualified staff and lack of training, absence of aqualityassuarance system and availability of consumable.*

Keywords: *Medical, surgical accident/orthopedic wards, length of stay, risk factors Abbreviations: AKTH=AminuKano Teaching Hospital Kano. MMSH= Murtala Muhammadspecialist hospital, MAWSH= Muhammad Abdullahiwase specialist hospital, I CU= Intensive critical care*

INTRODUCTION

Length of stay (LOS) is an important measure of resource utilization as patients with prolonged LOS disproportionately account for the consumption of more hospital resources (Siu et al.; 2018) Prolonged hospital admission or stay in the wards and intensive care unit (ICU) is defined =14 days stay in the ward or ICU and is associated with increased cost, resource utilization, and could contribute to patients' morbidity and mortality (Zampirieri et al., 2014, Tobi et al., 2015). Prolong hospital stay has been previously defined as more than 10 days or 21 days stay in the ICU(Wong *et al*.; 1999, . Hein *et al*.; 2006 and Kingsily *et al*.; 2019) However, there is no consensus definition of the prolonged length of stay (LoS) and the percentage of patients with LOS varies from one

center to another. It has been variously defined as over 10, 21 or 30 days More recently Zampieri et al (2014) described at the least a 14-day stay in ICU as being prolonged. The ratio of the prolonged stay was previously reported on 4-11% of all admission up to 45% of all ICU stays may be consumed by these patients (Laupland *et al*., 2006, Heyland et al., 1988 and Arabi et al., 2002).

Prolonged LOS, which is defined also as inpatient stay that exceeds the expected LOS for a certain procedure (Siu *et al*.; 2018) Patients with prolonged LOS are also at higher risks of nosocomial infections and unplanned readmissions (Schneider *et al*.; 2010, Jannasch *et al*.; 2015). In short, prolonged LOS disadvantages both hospitals and patients (Freitas *et al*.; 2012).

Prolongation of LOS due to HCAIs. From previous studies in Belgium (7.3 days), Greece and Cyprus (10.1 days), and England (14.1 days).(Vrijens *et al*.; 2012,Kritsotaki*et al*.; 2008 and Kritsotakis *et al*.; 2017)

There is limited data from Kano State related to prolonged stay in the medical, accident/ orthopedic and surgical ward in three selected hospitals. This study was retrospective study of all admission in the above hospitals to determine the prevalence and factors associated with delayed hospital stay and its outcome.

MATERIALS AND METHODS

After prior approval from Ethical committee, A retrospective study (July 2017) conducted at the medical, surgery and orthopedic/accident wards from each of the three selected hospital; study area of the AKTH, MAWSH AND MMSH referral hospitals with bed capacity of 700, 200 and 500 respectively.

Hospitals health records of patients admitted in medical, surgical and accident/orthopedic wards in the month July 2017. Data collected included patients' demographics such as name, sex, age. A patient who attained 14 days delayed hospital admission was selected. Prolonged hospital stay was assessed using the method of described by Tobi et al.,(2019) Others clinical variables like potentials risk factors that influence delayed hospital admission were evaluated and duration of stay and its outcome were examine. Patients with incomplete data were excluded from the study. Primary outcome variable was the total number of patients who had prolonged stay in the three wards of each hospital and factors that

affected delayed stay. Hundred questionnaires was distributed to medical health worker to assess risk factors in the three selected hospitals based on the hospital capacity, the health workers include medical doctors, pharmacy, nurses and medical laboratory scientist in each of the hospitals proportionate AKTH 35, MMSH 35 and MAWSH 30 respectively.

Primary outcome variable was the total number of patients who had prolonged hospital stay in the three hospital wards and factors that that affected prolongs stay. Prolonged hospital in those wards was defined as at least a14- day stay in the wards (Bennet et al., 2010)

Statistical Analysis

These variables were entered into SPSS version 16.0(SPSS Inc, Chicago, ILL, USA) for analysis. Non categorical data were analysed with Students t-test while Chi-squere and fishers exact test for categorical data like outcome. P<0.05 was considered as statistically significant.

RESULTS

Out of 994 admitted patients 401 were prolong hospital stay. For instance Aminukano teaching hospital, Murtala Muhammad specialist hospital (MMSH) and Muhammad Abdullahiwase specialist hospital were included in this study, the majority of the patients were at the age range 49-58years.Table 1 shows the sociodemographic features of patients with prolonged stay; male: female ratio of 1:1, with females constituting 50.1% of the patients. Patients aged 49 -58 years had more prolonged stay in the three hospitals.

The prevalence of prolong hospital stay in the three selected hospitals is 40.34%.Prevalence of prolonged hospital stay according to hospitals showed that, MMSH had the highest prevalence 140(50.54%) while MAWSH had the least 61(28.91%) hospital stayed. The distribution of hospital stay in the three hospitals is represented in Table 2. The statistical comparisons between the studied hospitals using the χ2 t- test showed chi- square test showed statistical difference between the hospitals this means that the epidemic potentials varied with hospitals. Table 3 shows The results of prolonged hospitals stayed according to the wards of the studied hospitals showed that, Accident/ Orthopedic ward had the highest prevalence 172(42.89%) of prolonged hospitals stayed while medical ward had the least prevalence 87(21.69%) of prolonged hospital stayed.

The statistical comparisons between the studied wards using χ2t- test showed chi- square test showed statistical difference between the hospital at p= 0.022.

Table 4 shows that the Factors responsible for prolong hospital stay showed that, all the studied factors (qualified staff, training documentation, equipment, SOPs , quality assurance, bed covers, stock out of drugs, sanitary, ICU, power supply, ICU specialists and more) were statistically different (p ≤0.05) from each of the three studied hospitals. 90.6% of the respondents reported that AKTH had qualified staff, followed by MAWSH (53.8%) and least in MMSH (20%). Furthermore, AKTH staff received training compared to those in MAWSH and MMSH. AKTH was having equipments in the laboratories, theaters and wards compared to its counterpart and still, regardless of their presences they are not used in some cases of prolonged hospital stay.

MMSH lacked of SOPs and quality assurance system compared to AKTH and MAWSH. It was also reported that MMSH lacked essential drugs/consumables in case of prolonged hospital stay and in addition, it experienced stock outs of these consumables within two weeks compared to AKTH and MAWSH. Majority of the respondents reported that AKTH had ICU facilities and readily available health personnel were also compared to MAWSH and MMSH. All hospitals had standard power supply in ICU. It was reported that both AKTH and MAWSH had better sanitary conditions compared MMSH as shown in Table 3.

Table1. *Descriptive socio-demographic characteristics of the respondents admitted at three selected hospital Kano state (n=401)*

Variables	Frequency(n)	Percentage (%)
Age group (year)		
18-28	37	9.2
29-38	43	10.7
39-48	75	18.7
49-58	111	27.8
59-68	80	20.0
69-70	55	13.7
Gender		
Male	200	49.9
Female	201	50.1

Table2. *Prevalence of prolonged hospital stay in three selected tertiary hospitals kano state, Nigeria*

Hospital	No. examined	Prolonged hospital stay n (%)	95%CI	χ^2 value	χ^2 p-value
AKTH	506	200(39.53)	(0.3533-0.4384)	23.571	≤ 0.0001[*]
MAWSH	211	61(28.91)	(0.2309-0.3530)		
MMSH	277	140(50.54)	(0.4466-0.5658)		
Total	994	401(40.34)	(0.3727-0.4342)		

Key: AKTH: Aminu Kano Teaching Hospital, MAWSH: Muhammed AbdullahiWase Specialist Hospital Kano, MMSH: Murtala Muhammed Specialist Hospital Kano.

Table3. *Prevalence of prolonged hospital stay based on Wards in three selected Hospitals Kano State, Nigeria*

| Type of Hospital | Hospitals Wards | | | χ^2- value | χ^2 p-value |
	Medical n (%)	Surgical n (%)	Accident/ Orthopaedic n (%)		
AKTH	44(22.00)	61(30.50)	95(47.50)	11.440	0.022*
MAWSH	20(32.79)	22(36.07)	19(31.15)		
MMSH	23(10.00)	59(42.14)	58(41.43)		
Total	87(21.69)	142(35.41)	172(42.89)		

*Key: * Statistically significant*

Key: AKTH: Aminu Kano Teaching Hospital, MAWSH: Muhammed Abdullahiwase Specialist Hospital Kano, MMSH: Murtala Muhammed Specialist Hospital Kano. a: p value of comparisons between the hospitals, b: p value of comparisons between the wards.

Table4. *Comparison between various factors that influences prolonged hospital stay in selected hospitals of Kano State.*

| Variables | Frequency of respondents per hospital, n (%) | | | χ^2 **p-value** |
	AKTH (n=32)	MAWSH (n=26)	MMSH (n=35)	
Are there qualified staff?				
Yes	29(90.6)	14(53.8)	7(20)	0.000
No	3(9.4)	12(46.2)	28(80)	
Do they receive training?				
Yes	31(96.9)	11(42.3))	5(14.3)	0.020
No	1(3.1)	15(57.7)	30(85)	
Any data to show the impact of training to reduction of hospital stay?				

Yes	30(93.8)	9(34.6)	9(25.7)	0.000
No	2(6.3)	17(65.4)	26(74.3)	
Are there equipment in the labs, theater and wards?				
Yes	27(84.4)	9(34.6)	10(28.8)	0.000
No	5(15.6)	17(65.4)	25(71.4)	
Are those equipment used in cases of prolonged stay?				
Yes	29(90.6)	4(15.4)	7(20)	0.000
No	3(9.4)	22(84.6)	28(80)	
Are SOPs available and used?				
Yes	31(96.9)	12(46.2)	5(14.3)	0.031
No	1(3.1)	14(53.6)	30(85.7)	
Are the available SOP relevant in helping prolonged stayed patients?				
Yes	28(87.6)	4(15.4)	4(11.4)	0.004
No	4(15.4)	22(84.6)	31(88.8)	
Are there quality assurance system?				
Yes	29(90.6)	18(69.2)	15(42.9)	0.000
No	3(9.4)	8(30.8)	20(57.1)	
Are essential drugs/consumables available during case of prolonged stay?				
Yes	30(93.8)	17(65.5)	8(22.9)	0.031
No	2(6.2)	9(34.6)	27(77.1)	
How often do you experience stock out of consumables and drugs?				
Weekly	19(69.4)	17(65.5)	5(14.3)	
2 week	13(40.6)	9(34.6)	30(85.7)	0.000
Are bed and bed sheets always available?				
Yes	32(100)	20(36.9)	15(42.9)	0.018
No	0	6(23.1)	20(57.1)	
Who provides the bed sheets?				
Hospital	32(100)	19(73.1)	6(17.1)	0.013
Patient	0	7(26.9)	29(82.9)	
Are there systems of bed change and bed making in your hospital?				
Yes	32(100)	18(69.2)	7(20.2)	0.010
No	0	8(30.8)	24(68.8)	
Are ICU facilities available?				
Yes	32(100)	20(76.9)	6(17.1)	0.021
No	0	6(23.9)	29(82.9)	
Are health personnel always available in ICU facilities?				
Yes	31(96.1)	18(69.2)	1(2.9)	0.000
No	1(3.1)	8(30.8)	33(94.3)	
Does the ICU have standard power supply?				
Yes	32(100)	24(92.3)	35(100)	0.000
No	0	2(7.7)	0	
Does your hospital have proper sanitary conditions?				
Yes	27(84.4)	22(84.6)	18(51.4)	0.002
No	5(15.6)	4(15.4)	17(48.6)	
How often do you observe general cleanliness?				
1 day	19(59.4)	22(84.6)	3(8.6)	0.000
2 days	13(40.6)	4(15.4)	27(77.1)	
>2 days	0	0	5(14.3)	

DISCUSSION

A total of four hundred and one patients (401) prolonged hospital stay patients were participated into the study. The age of the patients ranged from 18 years to 70 years. The mean age was 53.8 years. There were 200 (49.9%) males and 201(50.1%) females. Prolong hospital from Nigerian study is from 14 days in intensive care units, this study support evidence from previous observations (Zamperi *et al* ., 2014; Kingsily *et al.;* 2018 and Banu *et al*., 2018), 14days and above delayed hospital admission in our study broadly supports previous studies. However, previous studies have variously observed prolong hospital stay as 10, 21 and 30days which is contrary to our study (Williams *et al.,* 2010, Crozier et al., as cited king sily *et al*., 2018 and Eggenberger *et al*., 2014).

Our study revealed that high proportion of patients with prolongs hospital stay in three study areas Kano State Nigeria was 40.34%. AKTH (39.53%), MASH (28.91%) and MMSH (50.50%).this finding was lower than previous study by kingsly *et al*. (2018) 5.8%, cruzeir *et al.;* 2013 and Laupland et al.; 2006) prolong hospital admission in ICU, despite different prolong hospital stay in literature. The low proportion of prolong hospital stay at AKTH with high number of prolong hospital admission (39.53%) may attribute of the implementation of infectious control committee since in the hospital and good practice of hygiene.

Our study finding showed that Among the ward s or site of infections in the 3 study area Accident/ orthopedic and post-surgical were having higher percentage of prolong hospital admission, this could be attributed to the fact that, they often present with more severe injuries and undergo prolonged and more specialized procedures, as a result they would require a longer period of support and monitoring in the wards. Post-surgical patients was found to have shorter stay than medical patients this was in line with work of (Hughest at al.; 2001),

Different factors have been discussed as contributors to prolong hospital stay in ICU, need for mechanical ventilation, intracranial, blood transfusion etc. (Banu *et al*., 2018) this is contrary to our study, our study reported emphasis on factors responsible of prolong hospital stay in the three hospital in three wards as (qualified staff, training documentation,

equipment, SOPs , quality assurance, bed covers, stock out of drugs, sanitary, ICU, power supply, ICU specialists and more) included in the study were statistically different (p ≤0.05) from each of the three studied hospitals. 90.6% of the respondents reported that AKTH had qualified staff, followed by MAWSH (53.8%) and least in MMSH (20%). Furthermore, it was reported that AKTH staff received training compared to those in MAWSH and MMSH. AKTH was reported to have equipment in the laboratories, theaters and wards compared to its counterpart and still, regardless of their presence they were not used in cases of prolonged hospital stay.

MMSH lacked SOPs and quality assurance system compared to AKTH and MAWSH. It was also reported that MMSH lacked essential drugs/consumables for cases of prolonged hospital stay and in addition, it experienced stock outs of these consumables within 2 weeks compared to AKTH and MAWSH. 100% of the respondents reported that AKTH had ICU facilities and readily available health personnel in there compared to MAWSH and MMSH. All hospitals had standard power supply in ICU. It was reported that both AKTH and MAWSH had better sanitary conditions compared MMSH

Our finding that Accident/ orthopedic patients (42.89%) stayed longest in their ward could be attributed to the fact that, they often present with more severe injuries and undergo prolonged and more specialized procedures. As a result, they would require a longer period of support and monitoring in the ward. This is contrary to other postsurgical patients (35.41%) who have been found to have shorter stay. This finding is consistent with that of (Tobi *et al*., 2018).

In a Nigerian tertiary hospital, the ratio of patients older than 50 years with prolonged of stay was 28.9% (Tobi et al., 2015). This was in line with our study patients 50 years were having 28% prolong hospital stay.

Infection in hospital wards and ICU is a serious concern resulting in many clinical and medico-legal problems. Prolonged LoS is one of these problems resulting in unavailability of ICU beds. Dasgupta et al reported that infected patients stayed approximately more than 3-times longer than uninfected patients , this is seem to be consistent our study in which the prevalence of our study area is higher (Dasgupta et al., 2015).

Our study has recognized vital causes related to prolong hospital stay in hospitalized HCAIs patients; among these, at least eight factors, qualified staff, training documentation, equipment, SOPs, quality assurance, bed covers, stock out of drugs, sanitary, can potentially be addressed with appropriate interventions.

However, this study was not without limitations. The main limitation of this study is the prevalence of prolong and factors associated with prolonged hospital stay It was a review of case records of patients admitted over a six-month period, which may not necessarily be representative of all admissions and involved questionnaire's to assessed risk factors. Moreover, as the study involved a retrospective case record analysis, the quality of data collected was largely dependent on the adequacy of documentation and thus susceptible to missing or incomplete information. Lack of literature in Nigeria which makes it difficult to compare results

CONCLUSION

The prevalence of bacterial causing Nosocomial infection was 34.4%in the study area of Kano metropolis, the prevalence of prolonged hospital stay was AKTH (39.53%), MAWSH (28.91%) and MMSH (50.50%), Gram-negative pathogens and especially *E coli* was predominant isolates found in the three study area in Kano state.

Hospitals should not just keep patients for an extended period but should report such a group to the ministry of health so that help can come from Government.

Surveillance on risk factors and bacterial pathogens impacting on the duration of hospital stay should be mounted to ensure that these pathogens accurately managed to reduce the length of hospital stay by patient's.

ETHICS

The study was approved by, Health service management board Kano (HMB/GEN/ 488/ VOL.1, 16th FEB 2016), Ministry of Health Kano state(REF/OFF/797/TT/3B DATED. 20th Oct 2015) and Aminu Kano Teaching Hospital, Kano state Nigeria (AKTH/MAC/SUB/12A/P-3/VI/1600 15th Sep 2015). The procedures were followed in accordance with the ethical standards of the committee on human Experimentation, and with the Helsinki Declaration of 1975 as revised in 2000. Oral and written consents were obtained from the participants before the interview commenced; participation was voluntary and free.

AUTHORS CONTRIBUTION

Bashir Alkali and Halima Bashir conducted the laboratory work of this study. The first mentioned authors and Adamu Almustapha Aliero, Ibrahim Ntulume, Sanusi Bello Mada Faruk Sarkinfada and Agwu Ezera contributed equally to its content apart from the laboratory part. All authors read and approved the final version of this manuscript before submission

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