

ORIGINAL ARTICLE

Adolescent Medical Emergencies: Baseline Survey in a Nigerian Tertiary Hospital

Chizalu I NDUKWU¹
Joy C EBENEBE¹
Stanley K ONAH²
Jacinta C ELO-ILO¹
Chioma N MBACHU²
Ogochukwu C OFIAELI²
Nonyelum N JISIEIKE-
ONUIGBO³

¹Department of Paediatrics
Nnamdi Azikiwe University/
Nnamdi Azikiwe University
Teaching Hospital, Nnewi,
Anambra state NIGERIA

²Department of Paediatrics,
Nnamdi Azikiwe University
Teaching Hospital, Nnewi,
Anambra state NIGERIA

³Department of Medicine,
Nnamdi Azikiwe University/
Nnamdi Azikiwe University
Teaching Hospital Nnewi
Anambra state, NIGERIA

Author for Correspondence

Dr Chizalu I NDUKWU
Department of Paediatrics,
Nnamdi Azikiwe University/
Nnamdi Azikiwe University
Teaching Hospital Nnewi
Anambra state, NIGERIA

Phone: +234 806 680 4720
Email: ifeyc@yahoo.com
ch.ndukwu@unizik.edu.ng

Received: December 30th, 2018
Accepted: February 1st, 2019

DISCLOSURES
Financial support and
sponsorship: Nil.

Conflicts of interest: There were none

This work was presented at the 7th Excellence in Paediatrics conference in London, 10th to 12th December, 2015. ID: 166/OP6-GP-MH: Presentation 2. 7th ed. 2015 abstracts. 2015. Ineip.org

ABSTRACT

Background: Globally, there is dearth of data on non-traumatic adolescent medical emergencies, with most studies focussing on adolescent traumatic, psychotic and obstetric emergencies. There is need for extension of focus to this neglected area, especially in Africa where differences in lifestyle, perception and socioeconomic status may influence adolescent health.

Objective: To describe the morbidity pattern of adolescents admitted as medical emergencies in a Nigerian tertiary hospital and to identify factors that correlate with mortality amongst them.

Methodology: This was a prospective study of all adolescents aged 10 to 19 years consecutively admitted into the Children Medical Emergency Ward of a Nigerian tertiary hospital, over a 2 year period. Their bio-data, clinical condition at time of presentation and outcome at discharge from the emergency room were documented. Bivariate analysis for correlation of these factors with mortality was done utilizing the Statistical Package for Social Sciences version 20.

Results: Two hundred and two adolescents were admitted in the emergency room within the period. Their mean age was 13.3 \pm 2.3 years with male to female ratio of 1.5:1. The major presenting symptom was fever with the predominant disease category being infectious and parasitic diseases in 31.2% of them. A sickle cell disease crisis was responsible for 15% of admissions and was the commonest single disease entity amongst them. The mortality rate was 6.4%. Acute exacerbations of chronic diseases were responsible for 85% of the mortalities. Chronic kidney disease with case fatality of 36% was significantly correlated with mortality [OR 8.4 CI 3.2-22.3]. Gender, age and maternal educational status had no significant correlation to the outcome.

Conclusion: Acute exacerbation of chronic medical conditions account for poor outcome of medical emergencies in adolescents in the study centre. This calls for intensification of Preventive Medicare and adoption of the principle of pro active follow up of adolescents living with chronic diseases.

Keywords: Non-traumatic, Acute exacerbations, Chronic diseases, Outcome

INTRODUCTION

Adolescents constitute a significant proportion of the world's population, contributing about 10-25% of most populations.¹ There are about 1.2 billion adolescents worldwide and a large proportion of this age group are resident in low and medium income countries of which majority of African countries fall into.¹

Though considered generally to be a healthy age group, adolescents are burdened by a wide range of health challenges. Sexual, reproductive and mental health are presently the forefront focus of global adolescent research and interventions, with traumatic injuries from violence and accidents, being the recognized leading cause of mortality in this age group.^{2,3} Non-traumatic medical conditions like Human Immunodeficiency Virus infection (HIV) and lower respiratory tract infections, however are amongst the first five recognized causes of death amongst adolescents.^{1,2} Such medical and non-traumatic conditions should therefore not be neglected.

Presently, with over a million adolescents dying annually all over the world, Sub Saharan Africa tops the adolescent mortality rate charts contributing 43% of global mortality in 10 to 19 year olds.^{2,4} To address this, there should be a holistic overview of all the factors that contribute to poor health outcome in them, with specific attention, distinct from that given to younger children and adults. This will pre-empt measures that will help to protect the public health investments in early childhood, as well as acting as insurance for a healthy adult life.⁴

Infants and younger children are usually the mainstay of patient population in a typical Children Emergency Room constituting the major bulk of patients. This is not surprising, as they are known to be vulnerable and predisposed to infectious and potentially life threatening diseases. However, adolescent medical emergencies should not be neglected. This is because the adolescent developmental process tends to lead to the emergence of urgent situations, including psychological distress and crises.³

Many adolescents, in an attempt to solve medical issues they consider to be personal, may wait till the last minute before they give signal to a critical situation or may even precipitate medical emergencies because they ignore information that indicates a deterioration in their situation.³ Some emergencies arise as a result of their rapid growth spurt, which can render a previously adequate drug dosage in an existing chronic illness, inadequate.

Adolescents thus still die from diseases which have been successfully addressed in the global efforts to decrease infant and child mortality. Recent estimates of adolescent mortality show that many of the causes of mortality amongst them could be prevented or treated.³ Adolescent medical emergencies are often considered negligible and not recognized as a significant problem in this age group.

There is thus paucity of data on non-traumatic medical emergencies in adolescents especially in developing countries like Nigeria. Region specific epidemiological studies with extension of focus to such a neglected area are thus essential.

METHODOLOGY

This was a descriptive study involving all adolescents consecutively admitted into the Children Emergency Room (CHER) of the Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Anambra state, South East Nigeria, from March 2012 to April 2014.

NAUTH is a tertiary, university affiliated and Federal Government owned health institution which provides specialized health care to patients from within and around the state. The CHER attends to children from the post neonatal period to 18 years. Ethical approval to study emergencies in CHER within the period was obtained from the Research and Ethical Committee of the Institution (NAUTH /CS/66/VOL.5/26).

The CHER is manned by a complete medical team, with staff running 2 shifts for doctors and 3 for nurses. The doctors in the CHER team include a minimum of 2 consultant paediatricians, 2 senior registrars, 2 junior registrars and 2 house officers in every 24 working hours. Patients were attended to promptly based on emergency triaging. As a majority of patients pays for hospital services out of pocket due to poor health insurance coverage, the present hospital policy is that basic emergency care without immediate payment is accessible to the indigent within the first 24 hours of admission.

Data on the bio demographic characteristics, the duration of illness before presentation, presenting symptoms, signs and diagnoses of these children were obtained soon after initial resuscitation and entered into a structured proforma. Patients' clinical conditions were

monitored every 24 hours until exit from the emergency room, and outcome documented.

Adolescents with obstetric and traumatic injuries were excluded from the study. The data was initially entered into Microsoft Excel software. Analysis was done using both Statistical Package for Social Sciences (SPSS) version 20 and Microsoft excel. Chi square and Fischer exact (where indicated) statistical tests were carried out with value of $P < 0.05$ considered significant. Bivariate analysis for correlation of certain variables with mortality was done.

RESULTS

Bio demographic Characteristics

Two thousand, one hundred and seven patients were admitted in the Children Emergency Room within the period. Adolescents (ages 10 to 19 years) were 202 comprising 9.6% of all the patients. There were 121 males and 81 females with a male to female ratio of 1.5:1. Their mean age was 13.3 \pm 2.3 years.

Early adolescents (10 to 13 years) were 108 (53.5%), mid adolescents (14 to 16 years) were 73 (36.1%), while late adolescents (17 to 19 years with only 3 aged above 17 years) were 21 constituting 10.4% of the patients (Table 1). While 3.4% of the mothers had no formal education, 32.8%, 36.2% and 27.6% completed primary, secondary and tertiary education, respectively.

Clinical Presentation

The most common presenting symptom observed was fever in 47.5%, closely followed by pain in different body parts in 41.1% (Figure 1). A majority of the patients

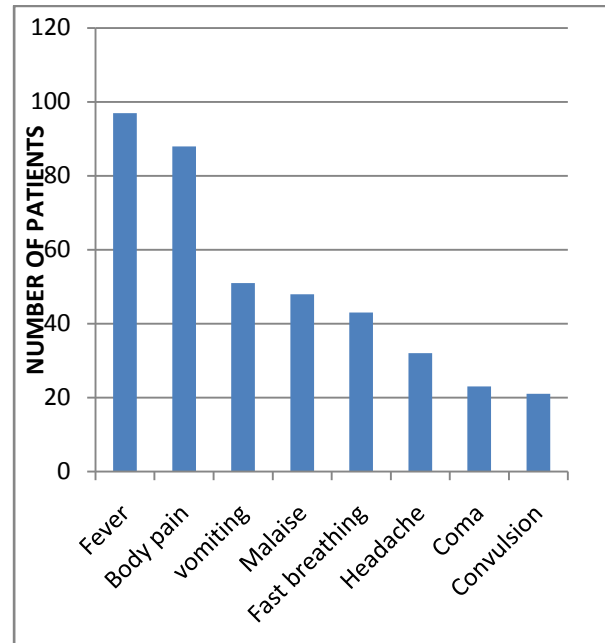
(131=66.6%) presented within the first 7 days of illness. Up to 45 (22.2%) of them actually presented on the first day of illness (Table 1).

Table 1. General characteristics

Characteristics	Frequency (N=202)	Percent age (Total=100%)
Age		
10 to 13 years	108	53.5
14 to 16 years	73	36.1
17 to 19 years	21	10.4
Gender		
Male	121	59.9
Female	81	40.1
Duration of illness (days) before presentation		
1	45	22.2
2 to 7	86	42.4
8 to 14	23	11.3
15 to 30	13	6.4
>1 month	29	14.3
Not specified	7	3.4

The predominant morbidities were infectious and parasitic diseases in 63 (31.2%) of the adolescents; out of this number malaria had the highest occurrence 27 (13%). However, the most common diagnosis was sickle cell disease with crises, in 31 (15%) of the patients (Tables 2 and 3).

Figure 1. Common presenting symptoms of the adolescents



Outcome of Admission

Thirteen (6 males and 7 females) of the adolescents died, giving an adolescent mortality rate of 6.4%. (Tables 2, 3 and Figure 2) Up to 84.6% of the mortalities occurred within 24 hours of presentation. The commonest presenting symptom in those that died was fast breathing (Figure 3).

Autopsy was not done because of the grief and the cultural inclination of the generality of the populace. Parents declined to give consent for autopsy despite it being made free the hospital management. Chronic kidney disease was the most common underlying cause of death (5 patients=38.5% of the mortalities) with the greatest case fatality of 36% [OR 8.4 CI 3.2-22.3].

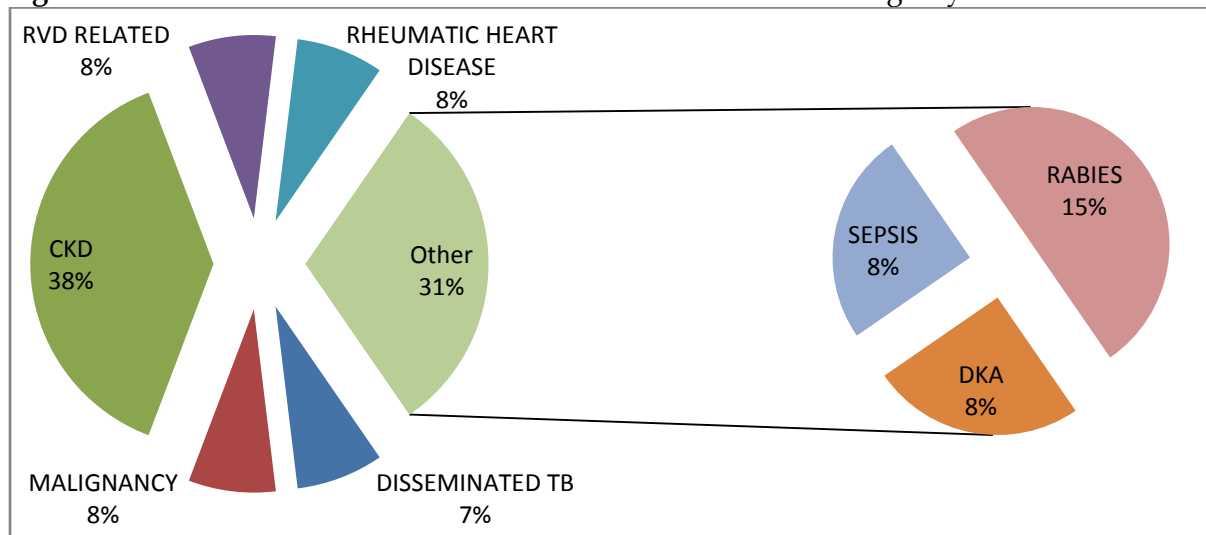
Table 2. Morbidity and mortality pattern of admissions (International Classification of Diseases-9)

Disease Category	Frequency (N=202)	Percentage (100%)	Mortality (N=13)	Percentage (100%)
Infectious And Parasitic malaria(n=27) HIV infection(n=16)	63	31.2	5	38.5
Blood And Blood Forming Organs Sickle cell anaemia (n=31[15%])	33	16.3	0	0
Genitourinary System Chronic Kidney Disease(n=14)	21	10.4	5	38.5
Central Nervous System Meningitis (n=6)	18	8.9	0	0
Respiratory System Asthma (n=9)	14	6.9	0	0
Circulatory System	6	3	1	7.7
Digestive System	7	3.7	0	0
Neoplasm	13	6.4	1	7.7
Others Surgical emergencies (n-18) Suicidal attempt (n=2)	27	13.4	1	7.7

Table 3. Common disease conditions presenting as adolescent medical emergencies in NAUTH Nnewi

Disease Category	Frequency (N=202)	Percentage (100%)	Mortality (N=13)	Percentage Mortality (100%)
Sickle cell anaemia	31	15	0	0
Malaria	27	13	0	0
HIV related disease	16	7.9	1	7.7
Chronic kidney disease	14	6.9	5	38.5
Bronchial asthma	9	4.5	0	0
Meningitis	6	3	0	0
Others	103	51	7	53.8

Figure 2. Causes of adolescent mortalities in NAUTH children emergency room



Factors Affecting Outcome of Illness

The relationship between diagnoses and mortality was significant (Fischer value = 16.198, $p < 0.05$). Chronic kidney disease was however, the only disease that was significantly correlated with mortality at 0.01 level. ($\chi^2 = 21.42$, $p = .001$) (NB: Only 1 of the patients who died from CKD presented to the facility for the first time after 2 months of herbal medication. The others had been previously diagnosed but were not consistent with renal replacement therapy mainly because of financial constraints).

The duration of illness had a significant relationship with mortality with 8 (61.5%) of those who died having had the ailment ongoing for more than a month ($\chi^2 = 24.6$, $p = 0.001$), as shown in Table 4. Respiratory abnormality at presentation was the only symptom that had a significant relationship and correlation with mortality (OR 6.1 CI 2.1-17; Spearman’s rho correlation significant at 0.01 level); Table 4.

Age and gender of the patients, and maternal educational status had no significant effect on

the outcome of admission. However, majority of those that died (N=9, 69%) were in their early adolescence while none of those in late adolescence died.

Figure 3. Common presenting symptoms in the adolescents that died

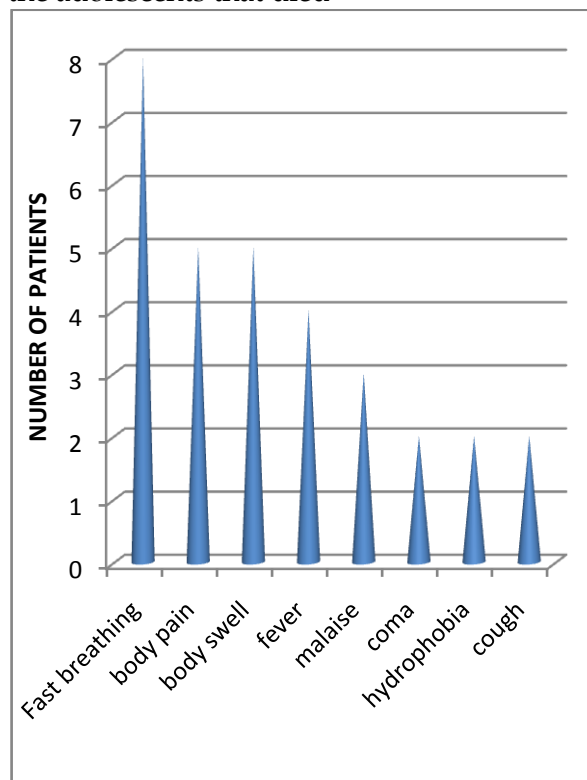


Table 4. Association of clinical factors with outcome

Clinical Factors	Outcome			Statistic	
	Mortality (%)	Survived (%)	Total (100%)	X ²	p-value
Duration of symptoms (days)					
1	2(4.4)	43(95.6)	45(100)	24.6	0.000
2 to 7	2(2.3)	84(97.7)	86(100)		
8 to 14	1(4.3)	22(95.7)	23(100)		
15 to 30	0(0)	13(100)	13(100)		
>1 month	8(27.6)	21(72.4)	29(100)		
Clinical presentation					
*With respiratory abnormality	8(19)	34(81)	42(100)	14.001	0.000
Without respiratory abnormality	5(3.1)	155(96.9)	160(100)		
With coma	2(9.1)	20(90.9)	22(100)	0.29	0.591
Without coma	11(6.1)	169(93.9)	180(100)		
With fever	4(4.2)	92(95.8)	96(100)	1.56	0.211
Without fever	9(8.5)	97(91.5)	106(100)		
With abdominal pain	3(6.8)	41(93.2)	44(100)	0.014	0.907
Without abdominal pain	10(6.3)	148(93.7)	158(100)		

*(OR 6.1 CI 2.1- 17; Spearman's rho correlation significant at 0.01 level)

DISCUSSION

This study highlights the need for increased focus on the adolescent medical health profile, with up to 9.6% of the emergencies in the index study being in adolescents. Although traumatic and non-accidental injuries are recognized leading causes of morbidity and mortality amongst adolescents especially in developed countries, medical and chronic illnesses should not be overlooked in this age group considered to be generally healthy.¹ The risk for neglect of this age group is further increased because of the wide acknowledgement that most adolescents who would have acquired optimal protective immunity from childhood killer diseases, are not old enough to suffer from degenerative disorders of later life.

The morbidity and mortality pattern reflects the postulated trend of the World Health Organization (WHO) with a predominance of acute exacerbations of chronic and non-

communicable diseases amongst this subclass of children.³ Increasing infant and young child survival, as a result of targeted global health intervention strategies amongst them is expected to lead to an increase in chronic sequelae of some of the infectious and non-infectious childhood killer diseases in adolescence.³

Sickle cell crisis and complications constituted the highest specific morbidity indicating that this remains a serious concern amongst adolescents in Nigeria. It mirrors the rising prevalence of sickle cell disorders across our population, as well as substantiating the increase in painful crisis observed in patients with sickle cell disease aged between 15 and 25 years.^{4,5} With increasing tendency for self assertion and the possibility of under estimating the severity of their disease,

adolescents may be less compliant with regular drugs and more careless about avoiding recognized precipitants. These in addition to other biologic factors may increase the tendency for them to have crises and may need to be studied further.

There was however, no mortality from SCD in this age group within the period. This differs from a study in the same centre involving younger children where there was 0.8% mortality from SCD.⁶ This is not surprising as infants and young children are known to be vulnerable and susceptible to a myriad of infectious diseases especially in Sub Saharan Africa with her gradually evolving healthcare system, more so when there is a co-existing chronic debilitating ailment. A study in Ilorin Nigeria, however, gave a mortality rate of 10% amongst patients with SCD aged 15 to 59 years with age being one of the correlates of mortality.⁷ However studies have shown increased survival of patients with sickle cell anaemia in Africa even beyond their third decade of life especially after surviving the first few years.^{7,8}

Chronic kidney disease was responsible for most of the mortality. This is not surprising as the outcome of CKD in a low income country like Nigeria is very bleak as highlighted in several studies.^{9,10} Many of these patients had financial constraints and this reflected in the manner and periodicity of renal replacement therapy, which was declined in many of the patients after initial sessions. This is consistent with other studies in Nigeria.^{9, 10} The few that could afford it in the index study found it difficult to sustain haemodialysis in the index centre because of the complications of the femoral route which is the favoured route in the centre. In Enugu Nigeria, up to 25% of

their patients on renal replacement therapy were lost to follow up with over 15% leaving against medical advice.¹⁰

A late presentation especially when the illness becomes critical is a significant and common problem in our environment.^{11,12} The major emergencies in the study were mostly acute exacerbations of chronic illnesses and longstanding ailments. The reasons for late hospital presentations need to be investigated and identified for appropriate interventional measures.

Accompaniment of respiratory disorder was the only significant symptom correlate preceding mortality and this is not peculiar.¹³ Campbell noted that abnormal respiration following respiratory failure is a common reason for presentation in emergencies and intensive care units.¹³ This underscores the need for provision of respiratory support in hospitals in resource poor settings like this.

CONCLUSION

Acute exacerbations of chronic medical conditions account for poor outcome of medical emergencies in Nigerian adolescents. This suggests the need for intensification of preventive Medicare and adoption of the principle of pro active follow up of adolescents living with chronic diseases. There is thus need for increased attention and investment on adolescent health, to ensure smooth and easy transition to a healthy adult life.

RECOMMENDATIONS

We suggest the development of guidelines for the pro-active follow up of adolescents with chronic health challenges and a need for accessible and affordable healthcare for

children, especially in resource poor environments.

More in-depth studies on patient, caregiver perception and management of adolescent chronic health problems are recommended.

REFERENCES

1. WHO. Adolescents: health risks and solution. Fact sheet number 345. May 2014 .Available at <http://www.searo.who.int/thailand/factsheets/fs0027/en/> [Last accessed 7/04/2019]
2. Michaud PA, Suris JC, Viner R. Adolescent health epidemiology. The adolescent with a chronic condition. Who Discussion papers on adolescence. WHO 2015. Available at www.who.int/maternal_child_adolescent/epidemiology/adolescence/en/ [Last accessed 07/04/2019]
3. WHO. Health for the world's adolescents. A second chance in the second decade. WHO fact sheet 2014. Available at https://www.who.int/maternal_child_adolescent/documents/second-decade/en/ [Last accessed 07/04/2019]
4. Friedrich MJ. Number of children with SCA increasing worldwide. *JAMA* 2013; 310 (7): 682. doi:10:1001/jama.2013.220225
5. Baum KF, Dunn DT, Mande GH, Serjeant GR. The painful crisis of sickle cell disease. A study of risk factors. *Arch Intern. Med.* 1987; 147: 1231-1234.
6. Ndukwu CI, Onah SK. Pattern and outcome of postneonatal paediatric emergencies in Nnamdi Azikiwe University Teaching Hospital, Nnewi, South East Nigeria. *Niger J Clin Pract* 2015; 18(3: 348-353.) doi: 4103/1119-3077. 153246.
7. Chijioke A, Kolo PM. The longevity and clinical pattern of adult sickle cell anaemia in Ilorin. *Eur J Sc Res* 2009; (32):528-532.
8. Ogun GO, Ebili H, Kotila TR. Autopsy findings and pattern of mortality in Nigerian Sickle Cell Disease patients. *Pan Afr Med J* 2014; 18:30. doi:10.11604/pamj.2014.18.30.4043
9. Olowu WA, Adefehinti O, Aladekomo TA. Epidemiology and clinicopathologic outcome of kidney disease in Nigeria. a single centre study. *Arab J Nephrol Transplant* 2013; 6: 105-1013.
10. Odetunde OI, Okafor HU, Uwaezuoke SN, Ezeonwu BU, Adiele KD, Ukoha OM. Chronic kidney disease in children as seen in a tertiary hospital in Enugu, South East Nigeria. *Niger J Clin Pract* 2014; 17: 196-200.
11. Adisa AO, Arowolo OA, Akinkuolie AA, Titiloye NA, Alatise OI, Lawal OO, et al . Metastatic breast cancer in a Nigerian tertiary hospital. *Afr Health Sci* 2011;11(2) 279-784.
12. Adejumo OA, Akinbodewa AA, Enajite O, Alli OE, Ibukun IF. Chronic kidney disease in Nigeria: Late presentation is still the norm. *Nig Med J* 2016; 55(3): 185-189.
13. MC Campbell. Terminal dyspnoea and respiratory distress. *Crib Care Clin* 2004; 20: 403-417.