Niger J Paed 2013; 40 (4): 354 - 359

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# Pattern and outcome of paediatric medical admissions at the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu: a five year retrospective review (2007 – 2011)

DOI:http://dx.doi.org/10.4314/njp.v40i4,1

Accepted: 6th March 2013

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**Abstract** *Background:* Most health information from Nigeria and other developing countries are based on hospital records which although may not be a true representative of the whole population, they serve as pointers. Such information has shown that infections and malnutrition remain the leading causes of morbidity and mortality, although non-communicable diseases also pose substantial threat to child health.
*Objective:* To review the pattern, trend and outcome of paediatric admissions at the University of Nigeria Teaching Hospital over a five year period.
*Methods:* Patients admitted into the main pediatric wards of the hospital over a five year period were reviewed, through information obtained from their case notes. Neonates, surgical and trauma patients as well as patients admitted into the children's emergency room were excluded.
*Results:* Infections (44.5%) were the leading causes of hospital admissions while non-communicable diseases were the leading causes of death in this study with an overall mortality rate of 9%.
*Conclusion:* Despite all efforts over the years, infections continue to pose serious challenges to child health in developing countries. At the same time, non-communicable diseases are taking over as leading causes of mortality. Therefore, as we make stronger efforts to tackle infections and malnutrition, we should make provisions for improved diagnosis and management of non-communicable diseases.

**Key words:** Outcome, Paediatric, medical admissions, Enugu.

## Introduction

Information obtained from the epidemiology of diseases is a valuable tool for healthcare administration and policy making. It is vital for healthcare planning, resource allocation and patient care as well as a source of information for healthcare decision makers on setting national priorities on health matters.
Most health statistics published in Nigeria are based on information from hospital records and although such statistics may not be true representation of what is obtainable in the entire population, such records of morbidity and mortality pattern may serve as pointers to what exists in the entire country.

Studies from most parts of Africa and other developing countries implicate infections and other communicable diseases such as malaria, acute respiratory infections, diarrhoea and measles as responsible for most hospital admissions and childhood deaths in this regions.[1-4] In contrast, non-communicable diseases are more prevalent and communicable diseases less prevalent in the adult population. This is attributed to their better developed immunity. The admission pattern has been reviewed in the adult medical wards of UNTH and showed that non communicable diseases are the most common conditions for medical admissions.[5] However, to the best of the authors' knowledge, there has not been any published work on the pattern and outcome of Pediatric medical admissions since the hospital relocated, about five years ago to its permanent site at Ituku-Ozalla, Enugu, a location about 21 kilometers from the city Centre. With the relocation, it is speculated that there may be a drop in the patient load to the hospital including pediatric patients, as patients with minor illnesses may not bother travelling such a distance to seek medical attention but go to nearby health facilities in the city center.

The study aims at reviewing the pattern, trend and outcome of Pediatric medical admissions over a five year period. Information from this study will be communicated to the hospital and other relevant authorities and may be useful for re- evaluating existing services and introducing changes if necessary.

## Patients and Methods

The study was carried out at The University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu which is about 21 km from Enugu urban, along the Enugu-Port Harcourt Expressway. The hospital relocated to its permanent site in January 2007 and serves as the main referral center for Enugu State residents as well as other neighboring States in the South East including Anambra, Imo, Abia, Ebonyi and Benue States. It has two main paediatric wards each with 30 beds and full complement of nursing, resident and consultant staff. Most patients are admitted from children emergency room (CHER), children out-patient clinic or the specialist clinics.

The study was retrospective and was approved by the hospital Health Research and Ethics Committee. The case notes of patients admitted into the main paediatric wards of the hospital from January 2007 to December 2011 was analyzed using combination of computer software (Excel 10, SPSS 20, Graph Pad Prism 5). Only patients beyond the neonatal age (28 days) with medical conditions and complete data sets were included in the analysis. Information extracted from the records included age, sex, domicile of patient in the last six months before admission. Domicile was categorized into urban and rural communities. Rural community refers to a community where families reside in relatively small areas and their main occupation and interests are farming and fishing while urban community is large with people engaged in varied occupations such as manufacturing, commerce, the profession or government jobs. Other information extracted included date of admission, source of admission, principal final diagnosis, duration and outcome of hospitalization.

## Results

There were 2,372 admissions during the period in review, however, only the records of 1,831 (77.2%) patients were analyzed. The remaining 541(22.8%) patients were either neonates (57), surgical/ trauma patients (115) or patients with incomplete data sets (369). The 1,831 patients comprised 1607 (87.8%) males and 224 (12.2%) females with a male: female ratio of 7:1. This ratio was consistent across all the age groups of the study patients. The ages of the patients ranged from five weeks to 18 years. Patients under the age of five years made up 66.2% of the admissions (1212). Table 1 shows the age and sex distribution of the patients. The average yearly admission rate was 366 and majority of the admissions was in the month of March. Table 2 shows the number of admissions per year while figure1 shows the average monthly admissions over the five year period. A total of 938 (51.2%) patients were residing in the urban areas while 893 (48.8%) resided in rural areas. Most of the patients (70.8%) were admitted through the children emergency room (CHER) while 23.4% and 5.8% were admitted via the outpatient clinic and other sources (specialist clinics or other departments) respectively.

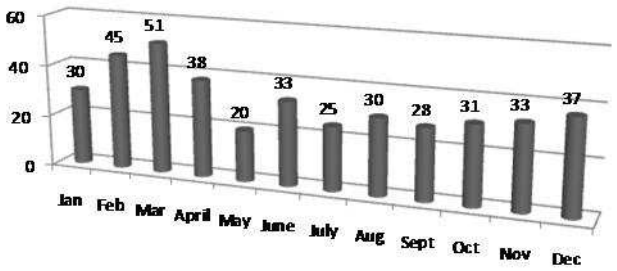
**Table 1:** Age and sex distribution of Patients

| Age | Male | Female | Total | Percent |
|---|---|---|---|---|
| 5weeks-5years | 1063 | 149 | 1212 | 66.2 |
| 6-10yrs | 268 | 33 | 301 | 16.4 |
| 11-15yrs | 218 | 35 | 253 | 13.8 |
| ≥16yrs | 58 | 7 | 65 | 3.6 |
| Total | 1607 (87.8%) | 224 (12.2%) | 1831 | 100 |

**Table 2:** Number of admissions per year

| Year | Number of admissions |
|---|---|
| 2007 | 138 |
| 2008 | 371 |
| 2009 | 499 |
| 2010 | 382 |
| 2011 | 441 |
| Total | 1831 |

**Fig 1:** Average monthly admissions over the 5 year period




*Reasons for admission*

Severe malaria (13%) was the commonest cause of paediatric medical admissions followed by septicaemia (12.8%) and acute lower respiratory infections (10.9%). Malignancies, renal and cardiovascular diseases ranked 5th, 6th and 7th among the leading causes of hospital admissions- Table 3. On the whole, infections, including malaria and HIV/AIDS constituted 44.5% of the morbidities. The five most common infections were severe malaria (238/1831), septicaemia (234/1831), pneumonias (200/1831), acute diarrhoea disease (139/1831) and meningitis (94/1831). Overt malnutrition made up four percent (73/1831) of total admissions.

**Table 3:** Reasons for admission

| Disease | All patients No (%) | ≤ 5 years No (%) | ≥ 5 years No (%) |
|---|---|---|---|
| *Infections* | | | |
| Severe malaria | 238 (13.0) | 194 (16.0) | 44 (7.1) |
| Septicemia | 234 (12.8) | 173 (14.3) | 61(9.9) |
| ALRTI | 200 (11.0) | 162 (13.4) | 38 (6.1) |
| Diarrhea diseases | 139 (7.6) | 127 (10.5) | 12 (1.9) |
| Meningitis | 94 (5.1) | 61 (5.0) | 33 (5.3) |
| HIV/AIDS | 52 (2.8) | 31 (2.6) | 21 (3.4) |
| Soft tissue infections | 31 (1.7) | 24 (2.0) | 7 (1.1) |
| Bone and joint infections | 22 (1.7) | 6 (0.5) | 16 (2.6) |
| Urinary tract infections | 18 (1.0) | 8 (0.7) | 10 (1.6) |
| Tuberculosis | 15 (0.8) | 8 (0.7) | 7 (1.1) |
| Measles | 4 (0.2) | 4 (0.3) | 0 (0.0) |
| Tetanus | 3 (0.2) | 2 (0.2) | 1 (0.2) |
| *Non-infections* | | | |
| Malignancies | 135 (7.4) | 62 (5.1) | 73 (11.8) |
| *Renal diseases | 131 (7.2) | 45 (3.7) | 86 (13.9) |
| +Cardiovascular diseases | 128 (7.0) | 70 (5.7) | 58 (9.4) |
| **Blood diseases | 113 (6.2) | 42 (3.4) | 71 (11.5) |
| ++Neurological diseases | 94 (5.1) | 58 (4.8) | 36 (5.8) |
| Severe protein energy malnutrition | 73 (4.0) | 71 (5.8) | 2 (0.3) |
| ##Respiratory diseases | 40 (2.2) | 30 (2.5) | 10 (1.6) |
| ***Digestive system diseases | | | |
| Endocrine/metabolic diseases | 20 (1.1) | 11 (0.9) | 9 (1.5) |
| | 10 (0.5) | 3 (0.2) | 7 (1.1) |
| Others | 37 (2.0) | 20 (1.7) | 17 (2.7) |
| Total | 1831(100) | 1212(100) | 619(100) |

*non- infectious renal diseases, **non- malignant blood diseases
***non-infectious digestive system diseases, +non-infectious cardiovascular diseases, ++non-infectious neurological diseases,
#non- infectious respiratory system diseases.

*Outcome of admissions*

One thousand, six hundred and seven (87.8%) of the 1,831patients were discharged home, to be followed up either at the out-patient or specialist clinic. The average duration of hospitalization of the survivors was 9.5 days. The total number of deaths was 165, giving a mortality rate of 9% over the period. Seven percent (11) of the deaths occurred within 24 hours of admission, 32% (52) died between the 2nd and 4th day of admission while the remaining died after four days. About 58% (96) of the deaths occurred in children under the age of five years while 4.2% (7) occurred in patients of 16 years and above. Eighty eight (53.3%) of the deaths was in children that resided in the rural areas compared with 77 (46.7%) from the urban areas. However, there was no significant difference in the outcome of hospitalization (mortality) between the rural and urban dwellers (Fischer's exact test, p=0.2). Fifty nine (3.2%) patients were discharged against medical advice (DAMA). Table 4 shows the outcome of admissions over the period while table 5 illustrates the age related mortality.

**Table 4:** Outcome of admissions

| Outcome | No. of cases | % of Total |
|---|---|---|
| Discharged | 1607 | 87.8 |
| Died | 165 | 9.0 |
| DAMA * | 59 | 3.2 |
| Total | 1831 | 100 |

*DAMA= Discharged against medical advice

**Table 5:** Age related mortality

| Age group | Number of patients | Number of deaths | Percentage mortality |
|---|---|---|---|
| 5weeks-5years | 1212 | 96 | 7.9 |
| 6-10years | 301 | 33 | 10.9 |
| 11-15years | 253 | 29 | 11.5 |
| 16-18years | 65 | 7 | 10.7 |
| Total | 1831 | 165 | 9.0 |

*Causes of death*

Disease related mortality showed that malignancies contributed 20.4% (34/165) of the total deaths with Burkkit's lymphoma as the most common (38/135) malignancy and contributing 8.5% (14/165) of total deaths. Other common malignancies contributing to death included acute lymphoblastic leukaemia (3.0%), acute myeloid leukaemia (1.8%), rhabdomyosarcoma (1.8%) and Wilm's tumour (1.8%). Renal diseases contributed 17.5% to total deaths with chronic kidney disease as the leading contributor (6.6%) to overall mortality. Among cardiovascular diseases, decompensated congenital heart disease (100/128) was the most common cause of death (16/100), thereby contributing 9.7% (16/165) of total mortality while acquired heart diseases (28/128) added 1.8% (3/165) to total deaths. Table 6 depicts the contribution of individual disease conditions to the overall mortality as well as their case fatality rates while tables 7 and 8 show specific malignancies and system related diseases respectively. Infections, including complicated malaria and HIV/AIDS contributed 34.5% (57) of the overall mortality while overt malnutrition contributed 4.2%. The five most common infections contributing to mortality were septicaemia, HIV/AIDS, pneumonias, meningitis and acute diarrhoea diseases-Table 9.

**Table 9:** Five most common infectious causes of mortality.

| Infection | Number of cases (%) | Number of deaths (%) | % of total mortality |
|---|---|---|---|
| Septicaemia | 234(12.8) | 16(6.7%) | 9.7 |
| HIV/AIDS | 52 (2.8) | 14 (26.9) | 8.5 |
| Pneumonias | 200 (10.9) | 8 (4.0) | 4.8 |
| Meningitis | 94 (5.1) | 7 (7.4) | 4.2 |
| Diarrhoea disease | 139 (7.6) | 5 (3.6) | 3.0 |

**Table 6:** Disease related mortality

| Disease | No of cases | No of deaths | Case fatality Rate | % of total deaths |
|---|---|---|---|---|
| Malignancies | 135 | 34 | 24.4 | 20.4 |
| Renal diseases | 131 | 29 | 22.1 | 17.6 |
| Cardiac diseases | 128 | 19 | 14.8 | 11.5 |
| Septicemia | 234 | 16 | 6.8 | 9.7 |
| HIV/AIDS | 52 | 14 | 26.9 | 8.5 |
| Pneumonias | 200 | 8 | 4.0 | 4.8 |
| Meningitis | 94 | 7 | 7.4 | 4.2 |
| Severe PEM**** | 73 | 7 | 9.6 | 4.2 |
| +Respiratory diseases | 40 | 6 | 15.0 | 3.6 |
| **Neurological diseases | 94 | 5 | 5.3 | 3.0 |
| Diarrhea | 139 | 5 | 3.6 | 3.0 |
| ++Blood diseases | 113 | 5 | 4.4 | 3.0 |
| Complicated malaria | 238 | 4 | 1.7 | 2.4 |
| ***Digestive system diseases | 20 | 2 | 10.0 | 1.2 |
| Tetanus | 3 | 2 | 66.7 | 1.2 |
| Tuberculosis | 15 | 1 | 13.3 | 0.6 |
| Endocrine/ metabolic diseases | 10 | 1 | 10.0 | 0.6 |
| +++Other diseases | 37 | 1 | 2.7 | 0.6 |

**non- infectious neurological diseases
***non diarrheal digestive system diseases
****protein energy malnutrition
+non-infectious respiratory system diseases
++non-malignant blood diseases
+++Skin diseases, eye diseases, otorhinolaryngological diseases, connective tissue diseases.

**Table 8:** Malignancies and their contribution to mortality

| Malignancy | Number of cases | Number of deaths | % of total mortality |
|---|---|---|---|
| Burkkit's lymphoma | 38 | 14 | 8.0 |
| Other lymphomas | 14 | 2 | 1.2 |
| leukemias | 29 | 9 | 4.8 |
| Retinoblastoma | 22 | 1 | 0.6 |
| Wilm's tumour | 11 | 3 | 1.8 |
| Osteosarcoma | 4 | 1 | 0.6 |
| Hepatic carcinoma | 4 | 2 | 1.2 |
| Total | 135 | 34 | 20.4 |

**Table 7:** System specific diseases and their contribution to mortality

| Disease | Number admitted | Number of deaths | % of total mortality |
|---|---|---|---|
| *Renal diseases* | | | |
| Nephrotic syndrome | 55 | 5 | 3.0 |
| AGN | 21 | 4 | 2.4 |
| ARF | 20 | 9 | 5.5 |
| CKD | 31 | 11 | 6.6 |
| Unspecified nephropathy | 4 | 0 | 0.0 |
| Total | 131 | 29 | 17.5 |
| *Cardiovascular diseases* | | | |
| Congenital heart Diseases | 100 | 16 | 9.7 |
| Acquired heart diseases | 28 | 3 | 1.8 |
| Total | 128 | 19 | 11.5 |
| *Blood diseases* | | | |
| Haemophilia | 7 | 0 | 0.0 |
| ITP | 1 | 0 | 0.0 |
| G6PD deficiency | 5 | 0 | 0.0 |
| SCA with complications | 97 | 3 | 1.8 |
| severe anaemia | 14 | 2 | 1.2 |
| Total | 113 | 5 | 3.0 |
| *Neurological diseases* | | | |
| Acute flaccid paralysis | 8 | 0 | 0.0 |
| Cerebral palsy | 7 | 0 | 0.0 |
| CVA | 6 | 2 | 1.2 |
| Encephalopathy | 26 | 3 | 1.8 |
| Febrile convulsion | 11 | 0 | 0.0 |
| None febrile seizures | 17 | 0 | 0.0 |
| Post ictal/meningitic motor deficits | 8 | 0 | 0.0 |
| Intracranial tumour | 3 | 0 | 0.0 |
| Spina bifida | 1 | 1 | 0.0 |
| Psychosis | 6 | 0 | 0.0 |
| Total | 94 | 5 | 3.0 |
| *Respiratory diseases* | | | |
| Bronchial asthma | 10 | 0 | 0.0 |
| Bronchiolitis | 6 | 0 | 0.0 |
| Chemical pneumonitis | 8 | 1 | 0.6 |
| Croup | 2 | 0 | 0.0 |
| Pertussis | 2 | 0 | 0.0 |
| Pleural effusion | 9 | 4 | 2.4 |
| Lung abscess | 2 | 1 | 0.6 |
| Complicated URT | 1 | 0 | 0.0 |
| Total | 40 | 6 | 3.6 |
| *Digestive system* | | | |
| Biliary obstruction | 3 | 0 | 0.0 |
| Liver cirrhosis | 4 | 2 | 1.2 |
| Peritonitis | 2 | 1 | 0.6 |
| Hepatitis | 8 | 0 | 0.0 |
| Intusception | 1 | 1 | 0.6 |
| Persistent diarrhoea | 2 | 0 | 0.0 |
| Total | 20 | 2 | 1.2 |
| *Endocrine/metabolic* | | | |
| Diabetes mellitus | 4 | 0 | 0.0 |
| Hypoglycaemia | 3 | 1 | 0.6 |
| Hypokalaemia | 2 | 0 | 0.0 |
| Goiter | 1 | 0 | 0.0 |
| Total | 10 | 1 | 0.6 |
| Others | 37 | 1 | 0.6 |

## Discussion

The study indicates that infectious diseases were the leading causes of hospital admissions especially in children under the age of five years in our centre with severe malaria as the commonest reason for admissions. This finding is comparable to earlier reports from this centre and other centres within and outside Nigeria. [6-8] There was no appreciable difference in the age distribution of the patients compared with that from other studies. [2, 3] However, there was a marked difference in the gender distribution of patients admitted into the pediatric wards of the hospital over the period in review compared with that from other studies. [3] The admitted patients were predominantly males (87.8%). Some studies from other parts of the world have also shown a male predominance in the incidence of diseases and this may be explained by the fact that during childhood, the extra X-chromosome or absence of Y-chromosome confers inherent survival advantage in females. [9,10] A second explanation which may be peculiar to the Eastern part of Nigeria and some parts of Asia is family male sex preference making it possible for families to seek health care for their male children earlier than for females. [11, 12] However, further review may need to be done to authenticate this unusual finding.

Severe malaria, septicaemia, acute lower respiratory infections and acute gastroenteritis in that order were the leading causes of hospital admissions. These disease entities have been shown to be the most common causes of pediatric hospital admissions in other parts of Africa. [1 ,4, 13] This high prevalence of preventable diseases reflects poor environmental sanitation, low level of personal hygiene, poverty and ignorance, and threatens child health indices even with just three years left before 2015, the target year for achieving the UN millennium development goals. It is worthy of note that measles which was recorded as the fourth most common cause of admissions by other studies [1,3] contributed only 0.2% (4 cases) of the total admission in our study. This may be attributed to an improved coverage of measles immunization. Overt malnutrition alone or in combination with other diseases especially infections contributed 4.0% of the total morbidity. This is lower than the figures from some other African countries [14, 15] although our figure may be influenced by its limitation of been a hospital based review. Children under the age of five years constituted 1,212 (66.2%) of the 1,831 admissions in this series with infections still the leading cause of morbidity, thus reflecting the vulnerability of this age group to various infections.

The overall mortality rate in this study was 9%. This is comparable with the rate of 9.5% noted in Ibadan, South West, Nigeria by Ayoola et al [16], but slightly lower than the mortality rate of 12.2% recorded from Abakaliki [4], a rural area in South East, Nigeria. The mortality rate in our review is also much lower than that (18.0%) observed in Uganda [17] earlier on (1999) and this may have resulted from improved diagnosis and management of these diseases over the years. On the other hand, the mortality rate in the present study is slightly higher than the rate (8.2%) documented by Menge et al in Kenya [1] and much higher than recent rate of 4.4% noted by Abhulimhen and Okolo [18] in Benin, South South, Nigeria. The difference in mortality rate from Benin and ours may be due to the fact that the former study was carried out in the emergency unit where most patients who survive the first 24 to 48 hours are transferred to the main ward and outcome of such patients are no longer recorded in the emergency ward register. It is possible that some of such patients may have died in the main ward and therefore not recorded in the mortality register of the emergency unit.
Most of the deaths (58.2%) occurred in children under the age of five years and was in keeping with findings from other studies [3, 4, 6] reflecting the high mortality in this age group due to less developed immunity.

The five leading causes of death in the present study were malignancies, renal diseases, cardiac diseases, septicaemia and HIV/AIDS. This observation is in contrast with other studies in the developing countries where infections such as malaria, acute lower respiratory infections and diarrhea diseases were main causes of mortality. This difference may be due to the fact that our study reviewed only patients admitted into the main wards, excluding those admitted into the children's emergency room where most acute infections would have been admitted, managed and possibly discharged. The relatively large contribution to mortality by non-communicable diseases in this series may reflect the diagnostic and management challenges facing developing countries in handling these cases. Most of these cases also present late due to ignorance, misconception and poverty of the care-givers. It could also be that there has been improvement in the management of infections and malnutrition as was suggested by Adeyokunnu et al. [19]

Developing countries have been battling with infections and malnutrition for centuries and these remain the leading causes of morbidity and among the top five causes of mortality as highlighted in this review. However, as vigorous efforts are been made to reduce their menace, non- communicable diseases such cancers, renal and cardiac diseases are taking turns as leading causes of mortality. It is therefore imperative that urgent measures be instituted to halt and reverse this trend in the near future. While stronger efforts are made to improve the socio-economic status of the general population, immunization coverage, childhood survival strategies and the literacy level of the people, improved funding and provision of modern diagnostic and supportive care facilities in the tertiary and probably secondary health care centers are recommended so as to meet up with the huge challenges imposed by these non-communicable diseases.

## Limitation

We could not find the admission register for 2002-2006 (five years before relocating to the new site). Probably it was misplaced during the transition period and therefore

we could not compare the admission pattern five years pre and post translocation.

**Author's contributions**

BF conceived the study, design and coordination, data collection, statistical analysis of the result and writing of the final manuscript. IJ, AN, and JM design and coordination of the study.

All authors read and approved the final manuscript.

**Conflict of interest:** None

**Funding:** None

**Acknowledgment**

The authors wish to acknowledge the invaluable services by the nursing staff of the main pediatric medical wards and also thank the medical record staff attached to these wards for providing case notes.

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