

REVIEW OF ONE YEAR MORTALITY PATTERNS AT THE ACCIDENT AND EMERGENCY OF A TEACHING HOSPITAL IN NORTHERN GHANA

Buunaaim ADB^{1,2}; Ekremet K³; Mock C⁴

¹Trauma/Orthopaedic Surgeon/Senior lecturer, Department of Surgery School of Medicine and Health Sciences, University for Development Studies, Tamale, Ghana; ²Department of Surgery-Trauma/Orthopaedics Unit, Tamale Teaching Hospital; ³Emergency Medicine Specialist, Department of Accident and Emergency Medicine Tamale Teaching Hospital; ⁴Professor of Surgery, Epidemiology and Global Health, University of Washington, USA. Harborview Injury Prevention and Research Centre

Abstract

Background: The burden of disease in every geographical area is reflected by the diseases patients present to hospital with and die from. Many deaths in hospitals occur in the emergency department. We sought to describe the mortality rate, patterns, and causes of death in the Accident and Emergency (A&E) Department of Tamale Teaching Hospital.

Methods: This was a retrospective review of deaths that occurred in the Accident and Emergency Department from January to December 2016. Information was gathered from death registers, folders, nurses' notes, and admission and discharge books.

Results: In 2016, 7,369 patients visited the A&E and 215 died, with a mortality rate of 2.9%. The age range of patients who died was 3-93 years. Most deaths (121, 50.2%) occurred in patients aged 50 years and above.

Over 60% of the deaths occurred in the first 24 hours. Most (69%) deaths were due to a medical cause. The leading individual causes were: sepsis (17%), trauma (16%), cerebrovascular accident (12%), and pneumonia (9%). The peak age group of medical deaths was 70-79 (eighth decade) years and peak age of surgical deaths was 30-39 years. Most patients (77%) died in the absence of an emergency physician.

Conclusion: The mortality of 2.9% can be reduced. The first 24 hours in the emergency is crucial since most of our patients died in this period and in the absence of an emergency physician on duty. In addition to increasing the equipment and supplies in the emergency department, increasing the number and availability of emergency physicians and improvement in records keeping will have an important role.

Key Words: Mortality, Death, Cerebrovascular accident (CVA)

Introduction

Information on the mortality pattern of every institution is a very relevant source of knowledge concerning the burden of disease. It provides information regarding the quality of care, challenges of care, and the debilitating diseases affecting patients in the communities served by the health facility^{1,2}.

The emergency department of every hospital serves as the gateway to the facility. It receives patients of varied conditions including medical and surgical cases of various degrees of severity, of which most are treated and discharged or admitted into the hospital for further

management. It is the emergency department that creates the platform for the correction of certain physiologic abnormalities in patients thus help prevent the progression of organ failure and eventually lowers mortality³. Reported rates of mortality vary widely across the world with about 15-60% of all deaths in a hospital occurring in the emergency department⁴.

Many factors contribute to mortality in Accident and Emergency departments all over the world. Delay in seeking care, lack of an efficient prehospital care and transport system, lack of equipment, severity of illness or injury, and inadequate skilled manpower in trauma and emergency all contribute to the mortalities we see in our facilities⁵⁻⁸.

This study is aimed at documenting the demographic data, crude mortality rate, the mortality patterns, and clinical causes of death of affected patients from January to December 2016 at the Accident and Emergency Department of Tamale Teaching Hospital. We believe this will provide relevant information for

Corresponding Author: Alexis Dun Bo-ib

Buunaaim

Department of Surgery School of Medicine and Health Sciences, University for Development Studies, Tamale, Ghana

Tel: +233545598020

Email Address: abuunaaim@yahoo.co.uk

Conflict of Interest: None Declared

policy makers in Ghana and other parts of Africa to design interventions to reduce mortalities in our A&E centres.

Materials and Methods

A retrospective review of patients who died at the A&E Department of the Tamale Teaching Hospital while on admission from January to December 2016 was carried out. This facility is the biggest referral hospital of about 350 bed capacity (as of the time of the study) in Northern Ghana and serves a population of over 4 million in the Upper East, Upper West and Northern regions including parts of Burkina Faso, Ivory Coast, and Togo. The Accident and Emergency department of the Tamale Teaching Hospital is a 12-bed capacity unit with a triage area of unspecified bed capacity. For the year under review, two Emergency Medicine Physician Specialists ran the department working averagely 52 hours a week with 3-medical officers, 7-emergency nurses and 39-general nurses with a few patient monitors, beds and a small triage area, but lacks some basic equipment for patient resuscitation and monitoring such as ventilator, defibrillator and patient monitors.

Information was gathered from patient folders, admission and discharge books, nurses' registers, and death certificate registers in the Accident and Emergency department. Data on patient demographics, clinical diagnosis/cause of death as documented by the doctor present at time of death, and duration of admission before death were collected. Patients who died in the wards after having left the Accident and Emergency were excluded from this study as well as patients who were brought in dead (BID). The data generated was entered in Excel and exported to SPSS version 16 for analysis. The results were illustrated using frequency tables and charts. Chi-square test was used for categorical data with a significance p value of 0.05.

The Ethical Research and Review Board of the Tamale Teaching Hospital approved the study.

Results

During the period under review, a total of 7369 admissions to the Accident and Emergency department were recorded. A total of 215 patients died, for a crude mortality rate of 2.9%. Among the deaths, 153 (64%) were males and 87 (36%) females. The age range of patients who died was from 3-93 years with a mean age of 50 ± 23 (SD) years.

The highest number of deaths occurred within the eighth decade (70-79 age group) (Table 1). Most deaths (121, 50.2%) occurred in patients who were aged 50 years and above. The mean age of death increased as the duration of stay increased. Younger patients appear to die in the first 24 hours more often than older patients (Table 2).

Table 1. Age and Sex Distribution

Age	Male	Female	Total	Percentage
0-9	3	1	4	2
10-19	7	5	12	6
20-29	18	10	28	13
30-39	21	6	27	13
40-49	15	9	24	11
50-59	19	9	28	13
60-69	15	9	24	11
70-79	23	18	41	19
80-89	7	7	14	7
90-99	3	0	3	1
Missing	9	1	10	5
Total	140	75	215	100

Table 2- Mean age of death with duration of stay in A&E

Duration before Death(Hours)	Age+ SD
Less than 24	49.0 \pm 4.0
24-48	56.6 \pm 7.7
48-72	57.8 \pm 16.6
More than 72	62.9 \pm 8.0

Table 3. Duration before death in A&E and sex distribution

Duration before death (hours)	Male	Female	Total	Percentage
< 24	95	25	119	64
24 to 48	23	9	33	18
48 to 72	6	7	13	7
72 and above	11	10	21	11
Total	135	51	186	100

footnote: "Data on duration of admission before death not available (missing data) for 29 patients; 9 females 20 males"

There was a preponderance of deaths in the first 24 hours (64% of all deaths, Table 3, Fig 1), and the number of deaths in the first 48 hours was about 4 times the deaths after 48 hours. Males were more likely to die in the first 24 hours (70% of all male deaths) than females (49% of all female deaths, $p=0.007$).

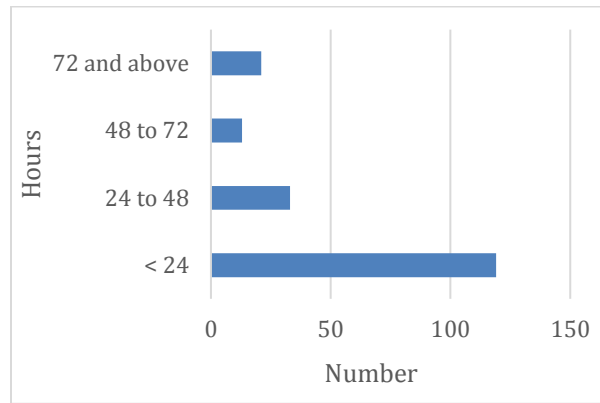


Fig 1. Duration of stay before death in Accident and Emergency

Clinical causes of death are shown in Table 4. Sepsis (17% of deaths) and trauma (16%) were the leading causes, followed by cerebrovascular accidents at 12%. Most deaths (69%) were from medical causes. Noteworthy is that data on clinical cause of death was missing for 31 cases. Knowing these causes of death might have changed the picture.

Table 4. Clinical causes of mortality

Causes of Death	Number	Percentage
Acute Abdomen	18	10
Asthma	5	3
Burns	2	1
CVA	22	12
Diabetic emergency	5	3
Heart failure	10	5
Liver disease	11	6
Severe Malaria	3	2
Malignancy	6	3
PE	2	1
Pneumonia	16	9
Renal condition	5	3
Respiratory failure	3	2
Sepsis	31	17
Haemorrhagic Shock	8	4
Snake bite	4	2
Trauma	29	16
Others	4	2
Total	184	100

Footnote: Data on clinical cause of mortality missing for 31 persons.

CVA: cerebrovascular accident. PE: Pulmonary embolus.

All of the broad categories of causes of death (medical, surgical, trauma) were most common in the first 24 hours (Table 5). The mean age for medical causes of death was 56 ± 19 years. About 63% of

Table 5. Categorical cause of death and duration before death (hours)

Duration before death (hours)	Medical	Surgical	Trauma	Missing	Total
Less than 24	68	15	16	20	119
24-48	19	6	3	5	33
48-72	9	1	2	1	13
More than 72	15	1	3	2	21
Total	111	23	24	28	186

Footnote: “29 patients lack duration before death”- Missing data.

medical deaths occurred in patients older than 50 years with the largest single group (24%) in the 70-79-year age group. The mean age for surgical causes of death was 41 ± 27 years. Among surgical deaths, 66% of the deaths occurred in patients less than 50 years of age. About 23% in the 30-39 age group.

The months of November (10%), March (13%), and December (15%) registered the highest number of deaths in an ascending order (Figure 2).

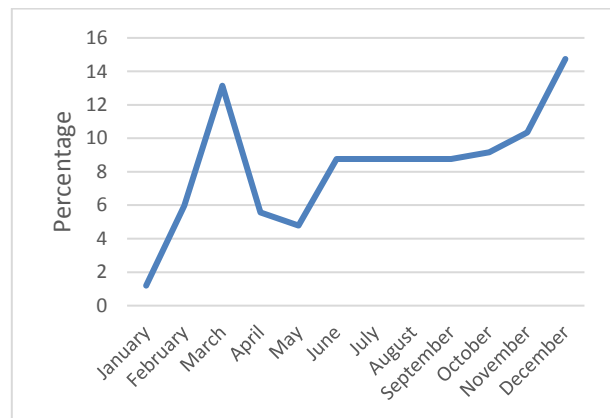


Fig 2. Monthly mortality

Most deaths (77%) occurred in the absence of an emergency medicine specialist. Moreover, this was especially a problem on weekends, when no emergency medicine specialist was available (Figure 3). Although Tamale Teaching Hospital does have emergency medicine specialists, it does not appear to have enough for full time coverage of the accident and emergency.

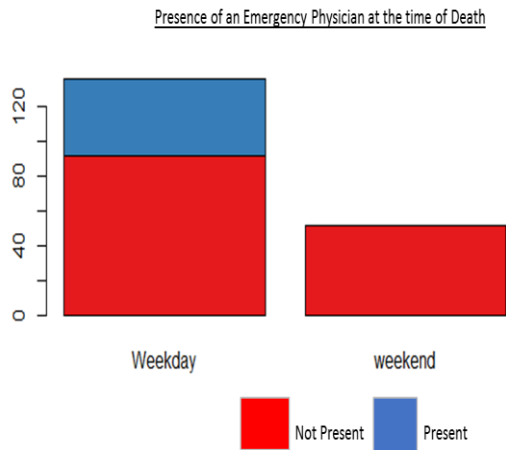


Fig 3. Presence of an emergency medicine physician at time of death, by weekday vs weekend

Discussion

The year 2016 under review recorded a total of 7,369 patients admitted to the Accident and Emergency department with 215 deaths representing a crude mortality of 2.9%. This rate is similar to what was recorded in a Nigerian tertiary institution⁹, but rather low compared to other studies within the sub-region recording a crude mortality rate of the range 4-8.6%^{1,5,10,11}. However a study in Port Harcourt in Nigeria recorded a rate of 2%⁶. These variations are bound to occur due to different infrastructure, human resource, and varied expertise in the various facilities reviewed, as well as different mixtures of types and severities of cases.

The male to female ratio of death was 1.7:1. This ratio is comparable to other studies recording similar findings^(1,6,10,11) showing male dominance in death. The data showed that the number of males dying in the first 48 hours on admission in the A&E was about 4 times the number of female deaths. This could be as a result of males usually reporting to hospital only when sickness is critical and also probably engaging in more risky adventures, since they usually do not want to appear weak in the family or community conforming to sociocultural beliefs. Also, more males are likely to engage in dangerous adventurous activities resulting in fatal injuries leading to death on admission to hospitals especially in trauma cases.

In our review, the mean age of death was 50 years and most deaths occurred in patients in the 8th decade of life. Half (50.2%) of deaths occurred in patients older than 50 years. This finding is surprisingly in variance to most studies within the sub-region which found most deaths occurring in the under 50 years group.^(1,6,9) This

was somewhat similar to what was found in London and Nepal^(12,13), where life expectancies are longer and thus one might expect higher average ages of presentation. However, in our setting it could probably be due to most deaths occurring in the older age group due to medical causes of death being the majority. Also the exclusion of patients who were Brought in Dead from the study could have made a difference.

Over 60% of deaths occurred in the first 24 hours, with the mean age of patients dying within 24 hours being 49 years. An increasing age of death was observed with more than 24 hrs duration of stay. This finding agrees with what was found in Nigeria by Kolawole et al. (64%) and Ekere et al. (70.9%) and in Nepal by Bharati et al. who reported almost 100% mortality within 24 hrs^{6,9,13}. However Ugare et al. reported differently in Nigeria, with 56% of deaths within the first 48 hrs on admission to the A&E.⁽⁵⁾ This is not surprising in our sub-region since most patients tend to report late to hospital when condition is critical probably due to poverty, lack of transportation to health facility, poor health seeking behaviour due to sociocultural factors, and inadequate prompt attention on arrival to health facility or poor triaging systems in the emergency departments. These need to be tackled head on if Africa will reduce mortality rates in emergency departments.

Mortality from medical causes in the first 24 hours was three times that from surgical and trauma combined. This finding is similar to most studies reporting higher mortality from medical causes in the first 24 hours of admission^{6,9,13}.

More than twice the number of deaths resulting from surgical (31%) causes was from medical (69%) cause of death in our study. Trauma (16%) and sepsis (17%) nearly equally accounted for the highest clinical cause of death followed by CVA (12%) with patients with missing data of 14%, which could have influenced the findings. Our finding is similar to what was reported by other studies^{9,14-16}. This is however in contrast to what was found by Chukuezi that trauma was the leading cause of death in their study in Nigeria¹. Among the medical causes of death, the specific causes were: sepsis (25%), CVA (15%) and pneumonia (12%). This is similar to what was found in other studies^{13,17}. Most patients dying with medical cause of death were older with a mean age of 56 ±19 years and with most deaths in the eighth decade- 70-79 year group (24%).

Of the surgical causes of death in this study, trauma was (51%), acute abdomen (31%) and sepsis (7%). The mean age of surgical deaths was 41 ±27 years with most death occurring in the 30-39 age group (23%). Therefore, younger patients were dying from surgical

causes compared with older patients dying from medical causes.

A lot needs to be done in most low and middle-income countries to reduce the deaths among young people from trauma since they are mostly the “work-horse” of every economy and the situation is likely not to get better due to increasing urbanization and industrialization in these countries. The introduction of basic emergency medical care into health systems and staff can help improve emergency care¹⁸

Most deaths (77%) occurred in the absence of the emergency physician. It is difficult to say with a degree of certainty that the presence of the emergency physician could have prevented the deaths of most of the patients. However, having more skilled providers (such as training more emergency physicians) present for the more severely ill or injured would likely have improved their chances of survival^{19,20}. A study in Rwanda demonstrated that the presence of Emergency Physicians through training can reduce mortality and improve quality of care in hospitals²¹. There is therefore the need for more trained emergency physicians, trauma surgeons, and emergency nurses all over Africa to help reduce mortalities in the emergency departments of our health facilities since about 15-60% of deaths in hospitals occur in emergency departments⁴.

Conclusion

The crude mortality rate in the Accident and Emergency department at Tamale Teaching Hospital in the year 2016 was 2.9%. Medical causes of death accounted for most deaths and most deaths occurred in the first 24 hours. Generally, older aged patients were likely to die of medical causes compared to younger aged patients who are most likely to die of surgical causes. Emphasis needs to be drawn to equipping health facilities, simple interventions to facilitate timely triaging of patients, prehospital care, education on prompt health seeking behaviour, good referral systems, increasing number of emergency physicians to allow a more consistent coverage, and regular in-service training on resuscitation, medical and surgical emergency care for providers. There is also a need to improve record keeping, monitoring quality of care and research funding of emergency care.

References

1. Chukuezi A, Nwosu J. Patterns of Death in the Adult accident and Emergency Department of a Sub-Urban Teaching Hospital in Nigeria. *Asian J Med Sci*. 2010;2:66-69.
2. Ekere AU, Yellowe BE, Umune S. Surgical mortality in the emergency room. *International orthopaedics*. 2004;28:187-190.
3. H. Bryant Nguyen, Suzanne Havstad, Bernhard Knoblich, Julie A. Ressler, Alexandria M. Muzzin, et al. Critical Care in the Emergency Department: A physiologic Assessment and Outcome Evaluation. *Academic emergency medicine: official journal of the Society for Academic Emergency Medicine*. 2000;7:1354-1361.
4. Alimohammadi H, Bidarizerehpooosh F, Mirmohammadi F, Shahrami A, Heidari K, Sabzghabaie A, et al. Cause of Emergency Department Mortality; a Case-control Study. *Emergency*. 2014;2:30-35.
5. Ugare GU, Ndifon W, Bassey LAE, Oyo-Ita AE, Egba RN, Asuquo M, et al. Epidemiology of death in the emergency department of a tertiary health centre south-south of Nigeria. *African Health Sciences*. 2013;12.
6. Ekere AU, Yellowe BE, Umune S. Mortality patterns in the Accident and Emergency Department of an urban Hospital in Nigeria. *Nigerian Journal of Clinical Practice*. 2005;8:14-8.
7. Eke N, Etebu E, Nwosu S. Road Traffic Mortalities in Port Harcourt, Nigeria. *Anil Aggrawal Internet J Forensic Med Toxicol*. 2000;1:1-8.
8. AN O, RO O. Mortality in the Accident and Emergency unit of Nnamdi Azikiwe University Teaching Hospital, Nnewi; Patterns and Factors involved. *Niger J Clin Pract*. 2002;5:61-63.
9. Kolawole OA, Idris OL, Adedeji OA, Olaitan PB. One year mortality review at the Accident and Emergency unit of a Nigerian tertiary institution. *Sch J App Med Sci*. 2016;4:483-488.
10. Onwuchekwa AC, Asekomeh EG, Iyagba AM, Onung SI. Medical mortality in the accident and emergency unit of the University of Port Harcourt Teaching Hospital. *Niger J Med*. 2008;17:182-185.
11. Osime OC, Ighedosa SU, Oludiran OO, Iribhogbe PE, Ehikhamenor E, Elusoji SO. Patterns of trauma deaths in an accident and emergency unit. *Prehospital and disaster medicine*. 2007;22:75-78.
12. Beckett MW, Longstaff PM, McCabe MJ, Sulch DA, Ward MJ. Deaths in three Accident and Emergency Departments. *Arch Emerg Med*. 1987;4:227-232.
13. Bharati U, Shrestha S. Mortality in Emergency Department of Nepal Medical College Teaching Hospital, a tertiary care centre in Kathmandu, Nepal. *Journal of Institute of Medicine*. 2017;39:94-98.
14. Adesunkanmi A, Akinkuolie A, Badru o. A five year analysis of death in accident and emergency room of a semi-urban hospital. *West African Journal of Medicine*. 2002;21:99-104.
15. Dim EM, Nwashindi A, Ndafia M, Dim U, Umanah I. One-Year Mortality Review at the Accident and Emergency Department of the University of Uyo

- Teaching Hospital,Uyo,Southern Nigeria. *Pioneer Medical Journal*. 2013; 9-17.
16. Uzoechina NJ, Abiola A, Akodu B, Mbakwem A, Arogundade A, Tijani H, et al. Pattern and Outcome of cases seen at the Adult Accident and Emergency Department of the Lagos University Teaching Hospital,Idi-Araba,Lagos. *Nig Q J Hosp Med*. 2012;22:209-215.
 17. Khan N, Razzak J, Alam S, Ahmed H. Emergency Department deaths despite active management:Experience from a tertiary care centre in a low-income country. *Emerg Med Austral*. 2007;19:213-217.
 18. Junaid A.Razzak ALK. Emergency medical care in developing countries:Is it worthwhile? *Bulletin of World Health Organization*. 2002;80:900-905.
 19. Wen LS, Geduld HI, Nagurney JT, Wallis LA. Africa's first emergency medicine training program at the University of Cape Town/Stellenbosch University: history, progress, and lessons learned. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine*. 2011;18:868-871.
 20. Elizabeth Molyneux SA, Ann Robertson. Improved triage and emergency care for children reduces inpatient mortality in a resource-constrained setting. *Bulletin of World Health Organization*. 2006;84:314-319.
 21. Aluisio AR, Barry MA, Martin KD, Mbanjumucyo G, Mutabazi ZA, Karim N, et al. Impact of emergency medicine training implementation on mortality outcomes in Kigali, Rwanda: An interrupted time-series study. *African journal of emergency medicine : Revue africaine de la medecine d'urgence*. 2019;9:14-20.
-