

## TRENDS IN ACUTE EMERGENCY ROOM HYPERTENSION RELATED DEATHS: AN AUTOPSY STUDY

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### ABSTRACT

**Introduction:** Hypertension is associated with increased morbidity and mortality. Paradigm shift and novel drugs that go beyond blood pressure control have debuted in the last decade globally and in Nigeria. The study therefore proposed to investigate the effect of the above if any on hypertension related acute deaths in patients admitted to the emergency room of the Lagos University Teaching Hospital.

**Method:** Autopsy reports for bodies deposited from the medical emergency room (ER) were reviewed. Details of the time of admission, time of death and blood pressure status prior to the event were obtained. Subjects were batched into two groups 1982–1991 and 1992–2001 based on periods of paradigm shift in hypertension diagnosis and management.

**Result:** There were 297 hypertension related deaths but 252 were analyzed. There were 168 (66.7%) males and 84 (33.3%) females (M: F 2:1) and mean age was  $47.33 \pm 12.18$  years (14–85yr). Two thirds of the subjects (65.5%) were  $\geq 50$  yrs of age. The mean duration of admission was  $5.88 \pm 6.41$  hours. One third (35.3%) died within an hour of admission. The commonest causes of death were stroke (52.8%) and heart failure 103 (40.9%). Intra-cerebral hemorrhage was the commonest type of stroke seen, 69 (52.3%). There were fewer cases of acute deaths in the second decade under review 95 (37.7%) vs. 157 (62.3%),  $p=0.02$  and strokes during this period, 47 (49.47) Vs 86 (54.78),  $p=0.06$ .

**Conclusion:** There is a trend towards reduction of hypertension related acute deaths. However stroke remains a major cause of acute hypertensive death and the patients are still dying young.

**Key Words:** Trends; Hypertension; Acute Deaths.

### INTRODUCTION

Hypertension is associated with increased morbidity and mortality<sup>1-3</sup>. These usually arise from end organ damage like cerebrovascular disease, hypertensive heart disease, myocardial infarction, renal disease and occlusive peripheral vascular disease<sup>1-3</sup>. Patients with target organ damage may die suddenly or have a protracted course of the illness. Stroke remains a common cause of acute death from hypertension especially in blacks<sup>4</sup>. Normalization of blood pressure has been found to reduce the advent of target organ damage and this effect is more marked with cerebrovascular disease than with ischemic heart disease<sup>5,6</sup>. In the recent past the target blood pressure for diagnosis of hypertension has been reduced due to findings in large epidemiological studies<sup>7-9</sup>. Also so many novel drugs that go beyond just blood pressure reduction, like calcium channel blockers, ACE-inhibitors and angiotensin receptor blockers, have debuted in the late eighties globally

and in Nigeria in the nineties. The question really is whether this increase in knowledge base and the advent of new drugs have affected mortality and morbidity. The study therefore proposed to investigate acute hypertensive deaths in patients admitted to the emergency room of the Lagos University Teaching Hospital (LUTH) to identify shifts if any, in acute mortality consequent on the new trends in diagnosis and management.

### METHODOLOGY

This is an autopsy study of deaths related to hypertension, occurring within 24hrs of admission into the emergency room of LUTH. Our hospital is a university institution providing tertiary care to the urban and some rural communities in Lagos and Ogun states of Nigeria. It is one of the two government owned tertiary centers serving a population of about eleven million residents in Lagos state.

Autopsy records of the Pathology department of the Lagos University Teaching Hospital from January 1982 to December 2001 were reviewed. Autopsy

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reports for bodies deposited from the medical emergency unit were retrieved. The reports that showed a hypertension related cause of death were further selected. Details of documented end organ pathologies were retrieved as well as the immediate and final causes of death.

Nurse's records for the study period were retrieved from the records department. Details of the time of admission, time of death and blood pressure status prior to death were obtained.

Patients who were brought in dead were excluded from analysis. Also patients who spent more than 24hrs in the emergency room before their demise were also excluded from analysis. Data from subjects who had conflicting documentation were also excluded from the analysis.

Data was batched into two groups 1982 - 1991 and 1992 - 2001, based on time periods of major paradigm shift in hypertension diagnosis and management.

### DATA ANALYSIS

Data was analyzed using SPSS for windows, version 10 statistical package. Continuous variables were analyzed as means and standard deviation. Non parametric variables were analyzed as percentages. Comparison of means between the two eras was reported as student's t test and chi square was used to compare percentages between the two groups. Any difference between the two groups was said to have reached statistical significant if the p value was less than 0.05.

### RESULTS

A total number of 6806 bodies were deposited from the ER and 4005 of these had autopsies performed during the 20yr period. This gave an autopsy rate of about 58.8% for bodies deposited from the emergency room. The autopsy rates for the pre and post calcium channel blocker periods were 68.9% and 50% respectively. There were 297(7.4%) hypertension related deaths amongst the subjects who had autopsy. Sixteen (16) of the subjects who had hypertension related deaths were brought in dead and 27 of the patients had incomplete data. These were excluded from further analysis and data from 252 cases were then analyzed. There were 168 (66.7%) males and 84(33.3%) females (M: F 2:1). The mean age of the subjects was 47.33±12.18yrs (14-85yr). There was no significant difference between the mean ages of males and females, 47.65±11.62 Vs 46.70±13.30, p=0.73. More than half of the subjects (65%) were ≥50yrs of age. The mean duration of admission was 5.81±6.31hrs. About one third of the subjects (34.0%) died within an hour of presentation and about half (51.2%) were dead in less than four hours. The commonest cause

of death was stroke which occurred in 133 (52.8%) of the subjects. This was followed by heart failure which occurred in 103 (40.9%) of the subjects. The other causes of death were myocardial infarction in 10(4%) and uremia in 6(2.4%). Intracerebral hemorrhage was the commonest variety of stroke seen (52.8%), followed by the intraventricular type of hemorrhage (27.6%). The other pathological stroke types seen were subarachnoid haemorrhage (11.2%), pontine haemorrhage (6.7%) and thrombotic stroke (0.7%).

There were more males in each category of cause of death and the type of stroke except for uremia which was lower in the males. However these differences did not reach statistical significance as shown in tables 1 and 2.

The mean age of the subjects was similar for the first and second decades under review, 47.49±12.90 vs. 47.10±4.07, p=0.8. The sex specific mean age also did not show any significant difference as shown in table 3. No statistical significant difference was observed in the other general characteristics of the subjects within the two time frames. There were significantly fewer cases of acute deaths in the second decade 95(37%) vs. 157(62.3%), p=0.02. The proportion of cases with stroke as the cause of death was lower in the second decade 1992 - 2001 than in the first decade 1982 - 1991, 86(54.78) Vs 47(49.47), p=0.06. The distribution of the other causes of acute death was similar in the two time periods (table 4).

Table 1: Sex Distribution of Cause of Death.

Cause of Death	Male N (%)	Female. N (%)	P value
Cerebrovascular Accident	90(53.57)	43(51.12)	0.82
Heart Failure.	66 (39.28)	37(44.05)	0.84
Myocardial Infarction	9(5.36)	1(1.19)	Not computed
Uremia.	3(1.78)	3(3.57)	Not computed
Total	168	84	

Table 2: Sex Distribution of Stroke Type.

Type of Stroke	Male N (%)	Female N (%)	Male: Female Ratio	P value
Intracerebral Hemorrhage	47(51.65)	24(55.81)	1.96:1	0.65
Intraventricular Hemorrhage.	25(27.47)	12(27.91)	2.08:1	0.96
Subarachnoid Hemorrhage.	12(13.19)	3(6.98)	4:1	0.44
Thrombotic.	1(1.10)	0(0)		
Pontine Hemorrhage.	6(6.59)	3(6.98)	2:1	0.7
Total	91	43	2.12:1	

**Table 3: Comparison of Some Parameters between the Two Decades under Review.**

Parameter	Time Period		P value
	1982 – 1991	1992 – 2001.	
Number of Acute Deaths	157(62.30)	95(37.0)	0.02
Sex: Male;	102(64.97)	66(69.47)	0.46
Female.	55(35.03)	29(30.52)	0.46
Age: mean;	47.49±12.90	47.10±11.07	0.81
Male;	47.07±12.67	48.23±9.96	0.54
Female;	46.22±16.05	44.59±13.02	0.64
Duration of Admission.	5.39±6.11	6.47±6.57	0.14

**Table 4: Comparison of the Causes of Death between the Two Decades under Review.**

Cause of Death.	Time Frame		p-value
	1982-1991 n (%)	1992-2001 n (%)	
Stroke	86(54.78)	40(49.47)	0.06
Heart failure	60(38.22)	33(45.26)	0.89
Acute myocardial infarction	6(3.82)	4(4.21)	Not computed
Uremia	5(3.18)	1(1.05)	Not computed
Total	157	95	

## DISCUSSION

That hypertension still constitutes an important cause of acute mortality in our environment is not in doubt as has been demonstrated in our data. In our environment this occurs in young people in the productive phase of life. The mean age of the subjects in this study was 47.33±12.18years and about two thirds of the subjects were =50years of age.

The commonest cause of acute death in our study was stroke. World wide stroke is the third commonest cause of death (next to cancer and ischemic heart disease) <sup>10</sup>. Heart failure ranked second as a cause of acute death during the period of the study and myocardial infarction was third, less than 10%. This is in keeping with documented evidence that blacks tend to have more hypertensive vascular disease than atherosclerotic disease with hypertension when compared with their Caucasian counterparts <sup>4,11</sup>.

World wide, there has been a downward trend in the prevalence of hypertension related morbidity and mortality with better control of blood pressure <sup>5, 12</sup>. This effect is more marked with stroke than with coronary artery disease <sup>5</sup>. From the above study, there was a reduction in the prevalence of hypertension related acute deaths, defined as death within twenty four hours of arriving in hospital, in the second decade under review. This may be a true reduction in acute mortality from hypertension due to lower cut off points for hypertension definition and use of novel drugs for hypertension that go

beyond blood pressure control. On the other hand this finding may be biased since the data is from a tertiary institution which gets mainly the complicated cases of acute target organ damage manifestation. Moreover the recent apathy in the utilization of facilities in the teaching hospitals in Nigeria may have affected this trend.

It is interesting to note that though there was a general trend towards total reduction, this was only reflected in the reduction in cerebrovascular accidents which tended towards significance, p=0.06. Ojini in Lagos reported a lower 30-day case fatality rate in strokes between 1995 and 1999 than a previous report from the same hospital in the period 1987 to 1991 <sup>13</sup>. Although the study did not evaluate acute mortality, the findings may well corroborate the trend in the reduction of stroke mortality in our institution.

The commonest type of stroke was hemorrhagic stroke and intracerebral hemorrhage was the commonest variety. This tends to agree with high proportions of ICH (21-48%) seen in American blacks and individuals of Chinese and Japanese ancestry <sup>14</sup>. This increased incidence of stroke in blacks over white (was also demonstrated in the south London stroke register analysis, (adjusted black white ratio of 2.2) <sup>15</sup>. The racial difference was seen for all pathological stroke types but was highest with intracerebral hemorrhage <sup>15</sup>. Excess burden of stroke has been attributed to excess of risk factors in blacks including uncontrolled hypertension <sup>15, 16</sup>. Moreover the blacks form part of the economically disadvantaged group and may not have access to adequate health care <sup>16</sup>. These same factors are very operational in a developing country like Nigeria. It is not surprising that most of the stroke was hemorrhagic since these are the ones more likely to die acutely.

Another striking finding in this study is the young age at death of the subjects who died from a stroke (47.93±12.34). Most stroke studies comparing racial groups have shown a significantly higher burden of stroke in blacks =65years of age than in their Caucasian counterparts <sup>15, 17, 18</sup>. Above this age group the disparity though persisting, is not as high between blacks and whites <sup>17</sup>. It is believed that the higher mortality rates would have decimated the number of blacks presenting with stroke in the age group above 65years <sup>17</sup>. Kissela et al in their study of a biracial population demonstrated the highest increase in stroke incidence rates of 2-5 in black males aged <65 years <sup>17</sup>. This is similar to findings in the Greater Cincinnati/Northern Kentucky stroke Study (GCNKSS) <sup>18</sup> which showed a 2-4 higher incidence of first ever strokes in blacks <65years when compared with whites of similar age group.

There was no significant sex difference in the case

prevalence of stroke and the pattern of stroke. In the study by Ogun et al there were more female subjects although this was not subjected to any statistical test<sup>19</sup>. The study by Ojini et al on the other hand did not perform any gender specific analysis<sup>13</sup>. A recent European multicenter study on gender differences in acute stroke registered more females during the one year period. The females were significantly older than the men and had a higher in hospital and 28-day mortality<sup>20</sup>. However most studies in blacks have demonstrated either higher case prevalence of stroke among black males than females<sup>17</sup> or similar age adjusted prevalence<sup>16</sup>.

The distribution of heart failure deaths in our study did not show any gender difference; neither did it reveal any change between the two time periods under review.

Prevalence of heart failure worldwide has continued to increase despite advances in diagnostic modalities and therapies<sup>21</sup>. This has been attributed to an ageing population and improvement in management of risk factors with increasing longevity of patients who have cardiac damage<sup>21</sup>. In the developed world it is regarded as the disease of the elderly affecting 6-10% of those older than 65years<sup>22</sup>. However in the present study, the mean age of patients who died acutely from heart failure was low  $46.44 \pm 11.84$ . The situation in this case may well be a reflection of the burden of hypertensive heart disease. Patients with acute heart failure have a very poor prognosis. In acute pulmonary edema a 12% in-hospital and 40% one-year mortality has been reported<sup>23</sup>.

Deaths from AMI were few in our study. There were more deaths from AMI in the males than the females though this could not be put to statistical analysis because of the small numbers. The male preponderance is not unexpected since most of the women from the calculated mean age ( $46.70 \pm 13.30$  yrs) would have been premenopausal. There was a slightly higher percentage in the second decade, 1992 - 2001. This may be in keeping with emerging reports of increasing incidence of ischemic heart disease and AMI in our environment<sup>24</sup>. A plausible explanation for the low figures generally may be that with increasing incidence and increasing awareness, patients are being better managed such that acute deaths are not rising as expected. It may also be that the patients are dying before getting to the emergency rooms because of more severe disease.

There was a slight increase in the duration of admission in the post calcium channel blocker era though this did not reach statistical significance. However about one half of the subjects were dead in less than four hours. This may suggest that there has not been much improvement in our facilities for managing the critically ill patient. On the other hand

it may reflect the burden of disease with which the patients are presenting as a third of them died within one hour leaving the caregivers very little time to intervene in the disease process.

In conclusion the above study has demonstrated some reduction in the acute mortality of hypertensive patients in our centre and this was contributed to by the trend towards reduction in stroke deaths. However stroke still remains the major cause of acute hypertensive deaths. It is important to note that these patients are still dying young and a few hours after admission. This we believe calls for an urgent review and upgrading of our critical care management facilities. This trend may be improved by a concerted effort among all stake holders to improve the awareness, control and management of hypertension. Limitations: We are aware that being an autopsy study there may be gaps in the study which may have affected the results. Also the fact that reports of patients brought in dead were excluded even when the deaths were hypertension related may have affected the actual number of deaths. However their inclusion would have affected analysis of some of the data evaluated. The inability to lay hold on some patients' records of previous level of blood pressure control did not allow further analysis and conclusions.

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#### REFERENCE

1. **Neaton JD, Wentworth DN, Stamler J, Kuller L**, for the Multiple Risk Factor Intervention Trial Research Group. Risk factors for death from different types of stroke. *Ann Epidemiol.* 1993; 3:493-499.
2. **Stamler J, Stamler R, Neaton JD**. Blood pressure, systolic and diastolic and cardiovascular risks: US population data. *Arch Intern Med* 1993; 153:598-615.
3. **Maschio G, Oldrizzi L, Marcantoni C, Rugiu C**. Hypertension and progression of renal failure. *J Nephrol.* 2000; 13:225-227.
4. **Kaplan NM**. Primary hypertension: natural history, special populations and evaluation. Clinical hypertension. In Kaplan NM (Ed). *Clinical hypertension*. 7th Ed (1998); Williams and Wilkins, Baltimore. 101-132.

5. **Collins R, Peto R, MacMahon S, Hebert P, Fiebach NH, Eberlein KA.** Blood pressure, stroke and coronary heart disease part 2, short term reductions in blood pressure: overview of randomized drug trials in their epidemiological context. *Lancet.* 1990; 335:827-838.
6. **Hansson L, Zanchetti A** for the HOT study group. Effects of intensive blood pressure lowering and low dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment (HOT) randomized trial. *Lancet.* 1998; 351:1755-1762.
7. Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. *JAMA.* 2003; 289(19):2560-2572.
8. Guidelines Sub-Committee. 1999 World Health Organization-International Society of Hypertension guidelines for the management of hypertension. *J Hypertens.* 1999; 17:151-183.GL.
9. Guideline Sub-Committee. 2003 European Society of Hypertension European Society of Cardiology guidelines for the management of arterial hypertension. *J Hypertens.* 2003; 21:1011-1053.
10. **Murray CJL, Lopez AD.** Mortality by cause for eight regions of the world: global burden of disease study. *Lancet.* 1997; 349:1269-276.
11. **Onwuanyi A, Hodges D, Avancha A, Weiss L, Rabinowitz D, Shea S et al.** Hypertensive vascular disease as a cause of death in blacks versus whites: autopsy finding in 587 adults. *Hypertens.* 1998; 31:1070-1076.
12. **Lawes CMM, Bennett DA, Feigin VL, Rodgers A.** Blood pressure and stroke: an overview of published reviews. *Stroke.* 2004; 35:1024-1033
13. **Ojini FI, Ogun SA, Danesi MA.** Thirty-day case fatality of stroke at the Lagos University Teaching Hospital. *Nig Qt J Hosp Med* 2004; 14(1): 64-66.
14. **Warlow CP.** Epidemiology of stroke. *Lancet.* 1998; 352(suppl 3): S1111-S1114.
15. **Wolfe CDA, Rudd AG, Howard R, Coshall C, Stewart J, Lawrence E et al.** Incidence and case fatality rates of stroke subtypes in a multiethnic population: the South London Stroke Register. *J Neurol Neurosurg Psychiatry.* 2002; 72:211-216.
16. **McGruder HF, Malarcher AM, Atoine TL, Greenlund KJ, Croft JB.** Racial and ethnic disparities in cardiovascular risk factors among stroke survivors: United States 1999 to 2001. *Stroke.* 2004; 35:1557-1561.
17. **Kissela B, Schneider A, Kleindorfer D, Khoury J, Miller R, Alwell K et al.** Stroke in a biracial population: The excess burden of stroke among blacks. *Stroke.* 2004; 35:426-431.
18. **Broderic J, Brott T, Kothari R, Miller R, Khoury J, Pancioli A et al.** The Greater Cincinnati/Northern Kentucky Stroke Study: preliminary first-ever total incidence rates of strokes among blacks. *Stroke.* 1998; 29:425-421.
19. **Ogun SA, Ojini FI, Ogunbo B, Kolapo KO, Danesi MA.** Stroke in south west Nigeria: a ten-year review. *Stroke.* 2005; 36:1120-1122.
20. **Di Carlo A, Lamassa M, Baldereschi M, Pracucci G, Basile AM, Wolfe CDA et al.** for the European BIOMED Study of Stroke Care Group. Sex differences in the clinical, resource use and 3-month outcome of acute stroke in Europe: data from a multinational hospital-based registry. *Stroke.* 2003; 34:1114-1119.
21. **McCullough PA, Philbin EF, Spertus JA, Kaatz S, Sandberg KR, Weaver RD, et al.** Confirmation of a heart failure epidemic: findings from the Resource Utilisation Among Congestive Heart Failure (REACH) study. *J Am Coll Cardiol.* 2002; 39: 60-69.
22. **Kannel W.** Epidemiology and prevention of cardiac failure: Framingham Study insights. *Eur Heart J.* 1987; 8(suppl F): 23-26.
23. **Roguin A, Behar D, Ben Ami H, Reisner SA, Edelstein S, Linns Edoute Y.** Long-term prognosis of acute pulmonary edema-an ominous outcome. *Eur J heart Fail.* 2000; 2:137-144.
24. **Akinboboye O, Idirs O, Akinboboye O, Akinkugbe O.** Trends in coronary artery disease in associated risk factors in sub-Saharan Africa. *J Hum. Hypertens.* 2003; 17:381-387.