ORIGINAL ARTICLE

A 20 year retrospective analysis of medicolegal deaths in a tertiary hospital setting in Nigeria

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Abstract

Objective: To determine and classify the various types of medicolegal deaths as seen at University of Benin Teaching Hospital (UBTH), Benin City, Nigeria.

Materials and Methods: This is a retrospective study of all the medicolegal deaths seen in the Department of Histopathology, (UBTH, Benin City over a 20 year period (January 1990-December 2009) as recorded in the autopsy registers of the department.

Result: A total of 5035 autopsies were done during the period, 89% of which were coroner cases. Four thousand, four hundred and eighty-one coroner cases representing 12.5% of all bodies received by the mortuary during the period were studied. The male to female ratio was 1.9:1, with an overall mean age of 38.3 years. The ages ranged from 1 day to 101 years with a peak incidence in the 25-44 years age group. A total of 553 children and 3928 adults were involved. The commonest indication for coroner's autopsy was sudden unexpected natural deaths (SUNDs) which accounted for 65.5% of the cases. Other causes of death were accidents, homicide, suicide, and undetermined causes representing 28.6, 5.0, 0.5, and 0.4%, respectively. Commonest cause of SUND was cardiovascular diseases with complications of hypertension being the most common CVS disease (26.9%). Road traffic accident was the commonest form of accident causing death (88.7%). Public enlightenment and health education about routine medical screening will help to reduce causes of natural deaths.

Conclusion: This study shows the pattern of medicolegal autopsies in UBTH and this preliminary data will provide a baseline for future research and help in formulating policies to help in reduction of preventable causes of death.

Key words: Accidental death, homicide, medicolegal death, road traffic accident, sudden unexpected natural death suicide

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Introduction

Medicolegal death is a term used to describe any violent, unclear, or suspicious death that must be subjected to legal investigation. Such deaths include unexpected, sudden or violent deaths, death of prisoners or persons in confinement, cases of homicides, suicides, death of persons undergoing medical or surgical procedures, and accident victims.[1] Such death investigation involves using the medicolegal death investigation system in that country. In Nigeria, the Coroner system of death investigation has used, a vestige of our colonial relationship with Britain.[2] Various countries use other medicolegal systems, including the medical examiner system and the procurator fiscal system.[3] The essence of investigating such deaths includes: To avoid secret homicides; for accurate death certification; and for demographic studies.[4] Although as far back as 44 BC, it is on record that Julius Caesar was the subject of an official autopsy after his murder by rival senators, the first law guiding medicolegal death investigations in Nigeria was made in 1944.[2] This

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law stipulated that only sudden deaths that involved non-natives were to be reported to the native authority for autopsy in the Northern region. However, this law was extended to everybody in the country by 1958.[2]

Various categories of medicolegal deaths have being studied in Nigeria. These include the works of Roche[5] in Lagos (1957), Asuni[6] in Ibadan (1962), Odesanmi[7] in Ife (1982), Amakiri[8] in Ibadan (1997), Nwosu[9] in Ife (1998), Aligbe[10] *et al.* in Benin City (2002) and Etebu[11] in Port Harcourt (2003).

This present study, although a retrospective one, covers a 20 year period and is teaching a hospital based study. A previous study from Benin was a 2-year prospective study covering the two major tertiary hospitals in Benin.[10] The aim of this study is to determine and classify the pattern of medicolegal deaths seen in a teaching hospital setting in Benin City and compare findings with previous works. The University of Benin Teaching Hospital (UBTH) is the only teaching hospital in Benin City, midwestern Nigeria. It renders service to inhabitants of Benin City and neighboring towns. Benin City has an estimated population of 1,086,882 (2006 census)[12] and is the centre of Nigeria's rubber industry. However, processing of palm nuts for oil is still an important traditional industry. Most of the people are civil servants, traders, farmers, and goldsmiths.

Materials and Methods

This is a retrospective analysis of all medicolegal autopsies done in UBTH, Benin City between January 1990 and December 2009. The cases were those sent from different wards in UBTH and other hospitals within Benin City metropolis. Also there were cases brought in dead (BID) either from home or picked up by officials of the Federal Road Safety Commission, police or good Samaritans.

The sources of information included autopsy registers of the department of histopathology, UBTH. Personal data with brief clinical summary of patients that died in the hospital were obtained from the coroner's form (BID cases had little or no information on their coroner's form). The cases studied were those in which standard full autopsies were done with or without histologic analyses where applicable. The summary of the autopsy findings were obtained from the post mortem reports written by the pathologist who carried out the autopsy. Medicolegal deaths were classified into sudden unexpected natural death (SUND), suicide, homicide, accidents, and undetermined.[13] All cases without autopsy reports were excluded from the study. A major limitation of this study is that ancillary investigations like toxicological, biochemical, molecular, and microbiologic analyses were not performed. Acute drug overdoses and toxicities could not be reasonably identified.

Results

During the study period of 1990 January to December 2009, a total of 35,914 bodies were received into the mortuary of UBTH. Autopsies were done on 5035 bodies, representing 14% of all bodies. Medicolegal autopsies were done on 4481 of them, representing 12.5% of all the bodies received. Table 1 shows the age and sex distribution of the cases reviewed.

Males constituted 65.4% (n = 2932) and females 34.6% (n = 1549) of all the medicolegal autopsies done with a male to female ratio (M:F) of 1.9:1. Autopsies done on adults (15 years and above) constituted majority of the cases and accounted for 87.7% (3928) of all cases. Males made up 66.9% (2627) and females 33.1% (1301) giving a M:F of 2:I. Medicolegal autopsies on the paediatric age group (1 day to 14 years) were the least and accounted for 12.34% (553) of all coroners autopsies.

Table 2 shows indications for medicolegal autopsies as seen in this study. This included SUNDs 65.5% (n = 2935), accidental deaths 28.6% (n = 1283), homicides 5% (n = 223), and suicides 0.5% (n = 23). The cause of death in 18 cases (0.4%) could not be determined after full autopsy procedures.

Table 3 shows the distribution of the causes of SUNDs. Cardiovascular diseases were the most common cause of SUNDs accounting for 26.9% of all cases and affected all age groups. The commonly encountered cardiovascular diseases were hypertension, congenital heart diseases, and cardiomyopathies. Other common causes of SUNDs were respiratory diseases (12.1%), neoplastic diseases (10.6%), and gastrointestinal diseases (8.3%). The common respiratory diseases were pneumonia, tuberculosis, and

Table 1: Age and sex distribution of autopsies in UBTH, 1990-2009

Age group	Males (%)	Females (%)	Total (%)
Neonatal (0-4 weeks)	18 (58.1)	13 (41.9)	31 (100.0)
Post-neonatal (2-11 months)	30 (46.2)	35 (53.8)	65 (100.0)
Pre-school age (1-4 years)	102 (52.8)	91 (47.2)	193 (100.0)
School age (5-9 years)	76 (61.8)	47 (38.2)	123 (100.0)
Young adolescents (10-14 years)	79 (56.0)	62 (44.0)	141 (100.0)
Young adults (15-24 years)	368 (63.6)	211 (36.4)	579 (100.0)
Adults (25-44 years)	1113 (67.5)	536 (32.5)	1649 (100.0)
Middle age (45-64 years)	784 (69.1)	350 (30.9)	1134 (100.0)
Elderly (65 years and above)	362 (64.0)	204 (36.0)	566 (100.0)
Total	2932 (65.4)	1549 (34.6)	4481 (100.0)

UBTH=University of Benin Teaching Hospital

Table 2: Age and sex distribution of medicolegal autopsies in UBTH

Age group	Natural		Accidents		Homicide		Suicide		Undetermine		Total
	M	F	M	F	M	F	M	F	M	F	
≤1 month	17	13	0	0	1	0	0	0	0	0	31
2-11 months	27	32	3	3	0	0	0	0	0	0	65
1-4 years	89	73	12	18	0	0	0	0	1	0	193
5-9 years	49	31	25	12	1	4	0	0	1	0	123
10-14 years	48	50	29	12	2	0	0	0	0	0	141
15-24 years	159	139	170	52	32	16	5	2	2	2	579
25-44 years	472	418	537	89	94	25	10	1	0	3	1649
45-64 years	553	286	191	52	32	10	3	1	5	1	1134
65 years and above	304	175	52	26	4	2	1	0	1	1	566
Total	1718	1217	1019	264	166	57	19	4	10	7	4481

UBTH=University of Benin Teaching Hospital

Table 3: Age distribution and types of natural causes of medicolegal autopsies in UBTH

Natural causes	≤1 month		2-11 months		1-4 years		5-9 years		10-14 years		15-24 years		25-44 years		45-64 years		≥65 Years		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Cardiovascular	7	8	3	3	6	6	3	2	5	4	22	8	92	60	201	124	139	96	789
Respiratory	2	0	6	9	19	16	7	5	8	10	19	18	66	42	57	24	35	13	356
Neoplasia	0	0	0	0	7	3	13	4	6	8	22	13	52	39	54	34	37	18	310
GIT	1	2	10	3	17	17	5	6	4	3	13	10	36	19	48	19	22	10	245
Miscellaneous	3	0	1	1	5	1	7	4	8	2	23	18	26	39	20	6	8	8	180
CNS	1	2	2	4	5	4	4	4	11	12	24	12	26	15	20	3	9	0	158
RVD	0	0	0	1	1	0	0	0	0	1	1	5	51	58	20	17	1	1	157
Kidney	0	0	0	0	1	1	2	2	0	1	19	13	41	26	19	3	10	7	145
Septicemia	2	1	0	2	7	4	4	4	3	1	5	5	26	26	29	11	5	3	138
Liver	0	0	2	1	1	0	1	1	1	2	7	5	36	15	30	8	12	3	125
Endocrine	0	0	0	0	0	0	0	0	0	1	2	4	14	15	41	20	18	10	125
Pregnancy	0	0	0	0	0	13	61	0	0	74									
Malaria	1	0	2	8	20	21	3	2	2	1	2	0	5	1	0	0	0	0	68
2 or more	0	0	0	0	0	0	0	0	0	0	0	2	1	2	12	6	7	9	39

UBTH=University of benin teaching hospital

obstructive airway diseases, while the common neoplastic diseases were those of lympho proliferative system, liver, and breast. In 39 cases (0.9%) of SUNDs, the cause of death was more than one and all such deaths were due to hypertension coexisting with diabetes mellitus.

Table 4 shows the distribution of accidental deaths. There were 1283 cases (26.8%) of accidental deaths in this study. These occurred in 1018 males and 266 females giving a M:F ratio of 3.9:1. All age groups but neonates were involved, with the highest rate occurring in 25-44 years age group (48.8%). Road traffic accident (RTA) constituted the majority of accidental deaths (88.7%). This was followed by burns which accounted for 8.9% of all cases. Other causes of accidental deaths were drowning, electrocution, falls, industrial accidents, and of carbon monoxide poisoning. The victims of RTA were drivers and passengers (48%), pedestrians (30.2%), and bike riders and their passenger (21.8%). The few cases of falls involved the elderly and resulted from falls at a standing level (slipping off the ground).

Table 4: Types of accidental deaths

Causes of death	Males (%)	Females (%)	Total
RTA	930 (91.4)	209 (78.6)	1139 (88.7)
Burns	67 (6.6)	47 (17.7)	114 (8.9)
Falls	5 (0.5)	4 (1.5)	9 (0.7)
Foreign body aspiration	4 (0.4)	1 (0.4)	5 (0.4)
Snake bite	2 (0.2)	2 (0.8)	4 (0.3)
Intraoperative asphyxia	2 (0.2)	1 (0.4)	3 (0.2)
Electrocution	3 (0.3)	0 (0.0)	3 (0.2)
Rabies	2 (0.2)	1 (0.4)	3 (0.2)
Drowning	2 (0.2)	0 (0.0)	2 (0.2)
Industrial accidents	1 (0.1)	0 (0.0)	1 (0.1)
Co^2 poisoning	0 (0.0)	1 (0.4)	1 (0.1)
Total	1018	266	1284 (100.0)

RTA=Road traffic accident

A total of 223 cases of homicide were seen and these accounted for 5.0% of all medicolegal autopsies done during the study period with a M:F of 2.9:1. Cases of homicide were seen in both children and adults with the majority (53.4%)

occurring in the 25-44 age group. Homicidal autopsies in children accounted for 3.6%. Most of the homicides in children were seen in children within 5-9 years age group. The youngest homicide victim was a neonate. Table 5 shows the methods of homicidal deaths. The commonest mode of homicide was gunshot, which accounted for 154 deaths (69.4%), followed by criminal abortion, which accounted for 26 deaths (11.3%), blunt force injuries, 20 deaths (9.0%), stab wound, 11 deaths (5%), suffocation 6 deaths (2.7%), sharp object injuries, 5 deaths (2.3%), and cut throat, 1 death (0.5%). Criminal abortion (non spontaneous or medically indicated abortions) accounted for 0.6% of medicolegal autopsies in this study and 11.3% of homicidal cases. These victims belonged to age groups 15-24 and 25-44 years. Blunt force injuries include homicides by use of clubs, batons, blows, and strangulations.

During the period of study, 23 cases of suicide were observed accounting for 0.5% of coroner autopsies performed. The M:F was 4.3:1 and the peak incidence was 25-44 years age group. No case of suicide was recorded in children. The only method of suicide in this study was by substance ingestion. The only method of suicide in this study was by substance ingestion (mostly local insecticide called otapiapia). The conclusion on the substance used was a very difficult one, but discovery of insecticide on the scene of death and extensive erosion of the gastric mucosa were good pointers. However, lack of toxicological analyses was a major drawback.

In this study, the cause of death in 18 cases (0.4%) could not be determined even after a postmortem examination (dissection and histology). If all ancillary investigations especially toxicology and molecular biology analyses were done, some of the deaths in this category would have been identified.

Discussion

This study reveals a medicolegal autopsy rate of 12.5% of bodies received in UBTH mortuary. This is relatively low compared to the medicolegal autopsies rate of 22.6%

Table 5: Distribution of homicidal causes of medicolegal autopsies according to sex in UBTH

Causes of death	Male (%)	Female (%)	Total (%)
Gunshot	129 (77.2)	25 (45.5)	154 (69.4)
Criminal abortion	0 (0.0)	25 (44.2)	25 (11.3)
Blunt force injuries	18 (10.8)	2 (3.6)	20 (9.0)
Stab wound	9 (5.4)	2 (3.6)	11 (5.0)
Suffocation	6 (3.6)	0 (0.0)	6 (2.7)
Sharp object injuries	4 (2.4)	1 (1.8)	1 (0.5)
Cut throat	0 (0.0)	1 (1.8)	1 (0.5)
Total	166	56	222 (100.0)

UBTH=University of Benin Teaching Hospital

in Ibadan. There was, however, a progressive rise in the rate of autopsies from 1990 to 2009. The reasons for this increase include sustained increased manpower following commencement of residency program in the department of pathology, UBTH and enforcement of hospital policy on coroner's law. The male preponderance, with a male to female ratio of 1.9:1 is similar to reports by other workers in Ibadan and Port Harcourt.[8,11] This may be due to the paternalistic nature of our environment with more men being involved in outdoor activities. Also, the mean age of 38.3 years agrees reasonably with the mean ages of 38.6 years and 40 years reported in Port Harcourt[11] and Ibadan,[8] respectively, thus constituting a great manpower loss to the nation as the most active age group of the society is affected.

The commonest indication for coroner's autopsy in this study was SUND which accounted for 65.5% of all cases. These findings are at variance with Aligbe *et al*'s[10] 2 year prospective study of coroner's autopsy between 1996 and 1997 which found unnatural deaths (accidents, homicides, and suicides) to be the commonest indication for medicolegal autopsies. In that study, accidents, homicides, and suicides together accounted for 66.8% of medicolegal autopsies. The reasons for this difference are not clear but the high number of cases of unnatural deaths (accidents, homicides, and suicides) in the previous study may be a reflection of the rate of violence in military regime which ruled the country at that time. Also the coroner's law was implemented and enforced in 2001 leading to performance of autopsy on all coroner's cases including deaths within 24 h of admission into a hospital. However, the high rate of SUNDs is in consonance with 55.6% reported in UCH Ibadan[8] but differed completely from 11.0 and 19.8% reported in Ife and Port Harcourt, respectively.[7,11]

Cardiovascular system (CVS) diseases were the highest causes of SUNDs followed by respiratory diseases. Hypertension and its complications accounted for 74.8% of the cardiovascular deaths. The incidence of hypertension is very high in our environment being a black population. Studies in United States of America show that cardiovascular system diseases was responsible for 60% of all natural deaths with coronary artery disease being the main cause of cardiovascular death.[14] A similarly high rate of death from CVS diseases is reported in India.[15] Respiratory diseases, the most common cause of SUND after CVS disease in this study, was also the second most common cause of SUND in the studies from Ife, Ibadan, and Port Harcourt.[7,8,11]

SUND during childhood in this study was caused by respiratory diseases, gastrointestinal diseases, malaria, and central nervous system diseases. Findings from studies in other parts of Nigeria agreed with the diseases listed above as the common causes of pediatric medicolegal autopsies.[7,8,11]

Accidents accounted for 28.6% of the autopsies in the

present study with a male to female ratio of 3.9:1. RTA constituted the majority of accidental deaths (88.7%) just like in other studies.[16] RTA was also the commonest cause of accidental death in the series by Aligbe *et al.*[10] and Amakiri.[8] Earlier reports have attributed the high RTA rates to the poor condition of roads and vehicles.[6] The current situation is even worse due to worsening economic conditions with attendant poor roads plied by fairly used vehicles imported into the country. The Federal Government of Nigeria, in an attempt to stem the rising tide of RTA in the country, banned importation of vehicles that have been used for more than 10 years. The role of alcohol and other drugs as important epidemiological factors in RTAs are well recognized.[17] Our motor parks are very popular spots for the sale of all sorts of alcoholic beverages and other stimulants. Also in these parks, there are no forms of regulation regarding the buying or selling of these alcoholic substances. Due to lack of toxicological analyses, the cases of alcohol intoxication were not established in the cases of RTAs. Major contributing factors to this are the absence of the technology and financial wherewithal.

Burns accounted for 8.9% of accidental deaths. This is unlike findings in Ife,[7] Ibadan,[8] and Port Harcourt[11] in which burns recorded 0.6, 4.6, and 3.4%, respectively. This high number may not be unconnected with cases of burns due to oil pipeline explosions in the neighboring state of Delta which occurred during the study period and were referred to our center for management.

Homicidal deaths accounted for 5.0% of the whole study. Although different rates were reported by different authors[7,8,9,11] there is agreement, however, about male preponderance, common age range of 20-45 years, and use of firearms as the commonest cause.

During the period of study, few cases of suicide were observed accounting for 0.5% of coroners autopsies performed. The rate of suicide in this study is similar to findings from other studies in Nigeria.[8,9,11] Odesamni[7] and Akhiwu *et al.*[18] reported relatively high suicide rates of 4% and 1.8%, respectively. Higher rates are reported in more advanced countries.[19,20] Although psychiatric illness, frustration, and unemployment abound in our environment, low suicide rate in our environment may be due to close family ties and supportive, communal living and way of life prevalent in developing economies.

One class of medicolegal death is the undetermined category implying that the cause of death could not be ascertained after full autopsy procedures.[13] Classification of a death as being undetermined commonly results from the lack of information and lack of access to advanced medical tools and technologies. Many such cases involve decomposed bodies, infants whose deaths are otherwise classifiable as sudden infant death syndrome but for whom the circumstances permit no presumption of a natural death and drug intoxications where there is a suspicion of suicide.[21] We found 18 undetermined cases (0.4%) during the period under review. This was smaller than 1.4, 2.3, and 3.0% obtained in Ibadan, Ife, and Port Harcourt, respectively.[7,8,11] These cases were abandoned, severely decomposed bodies.

It is concluded in this study that SUNDs due to complications of hypertension and accidental deaths following RTA s are the most common types of medicolegal deaths.

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