Original Article

Profile and causes of mortality among elderly patients seen in a tertiary care hospital in Nigeria

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Abstract

Background: Old age is one of the factors associated with increased risk of dying when admitted to hospital. Therefore, aim of this study was to examine causes and pattern of death among elderly patients managed in a tertiary care hospital in Nigeria with scanty mortality records.

Materials and Methods: This prospective study was on deaths that occurred in patients 60 years and above admitted to University of Ilorin Teaching Hospital (UITH), Ilorin, between January 2005 and June 2007. Excluded were all brought-in-dead during the study period. Information obtained included demographic data, duration on admission, and diagnosis. Causes of death were determined from clinical progress notes and diagnosis.

Results: A total of 1298 deaths occurred during the study period, of which 297 occurred in persons 60 years and above with crude death rate of 22.8%. The mean age at death was 68 ± 9 years (ranged 60-100 years). This consisted of 59% males and 41% females. Mean age at death for females was 69.7 ± 8.7 years and for males 68.1 ± 9.8 years (P=0.05). Mean values of serum chemistry were sodium 137 ± 8 mMol/l, potassium 3.6 ± 1 mMol/l, urea 11 ± 8 mMol/l, and creatinine 126 ± 91 μmol/l. The value of mean haemogram concentration was 10.5 ± 3 gm/dl and white cell count was 12 ± 2 × 10^9/ mm^3. The three most common diagnoses at deaths were stroke (19.8%), sepsis (16.5%), and lower respiratory tract disease (8.1%). Infectious diseases accounted for 38.2% of all diagnoses. Collective mean length of hospital stay (LOS) at death was 6.8 ± 8.6 (ranged 15 minutes-60 days). Close to 27.4% of the deaths occurred within 24 hours and neurological disorder had shortest hospital stay (4.6 ± 6.3 days), followed by endocrine disorders (6.8 ± 8.4 days) and respiratory diseases (8.4 ± 5.6 days) [P=0.001].

Conclusion: Hospital mortality is high amongst older people. Stroke and infectious diseases are leading causes of death. Efforts should be geared toward reducing risk for cardiovascular diseases and improvement on level of personal and community hygiene.

Keywords: Death, diagnosis, elderly patients, in-hospital

Résumé

Arrière-plan: Vieillesse est l'un des facteurs associés à un risque accru de décès lorsque admis à l'hôpital. Par conséquent, but de cette étude était d'examiner les causes et patron de décès chez les patients âgés gérés dans un hôpital de soins tertiaires au Nigeria avec records de mortalité insuffisants.

Matériaux et procédés: Cette étude prospective était sur les décès qui s'est produit chez les patients atteints de 60 ans et plus haut admis à l'hôpital d'enseignement de l'Université d'Ilorin (UITH), Ilorin, entre janvier 2005 et juin 2007. Exclus étaient tous mis-à-morts au cours de la période d'étude. Les renseignements obtenus inclus les données démographiques, durée sur l'admission et le diagnostic. Causes de décès ont été déterminés de diagnostic et de notes des progrès cliniques.

Résultats: Un total de 1298 décès survenus au cours de la période d'étude, dont 297 a eu lieu chez les personnes de 60 ans et plus avec un taux brut de mortalité de 22,8%. L'âge moyen de décès a été 68 ± 9 (variait entre 60-

100 ans). Il s'agissait de 59% de mâles et 41% de femmes. Moyen âge au moment du décès pour les femmes était 69,7 ± 8,7 ans et pour les hommes 68,1 ± 9,8 ans (*P*=0,05). Les valeurs moyennes de la chimie sérique étaient sodium 137 ± 8 mMol/l, potassium 3,6 ± 1 mMol/l, l'urée ± 8 11 mMol/l et créatinine 126 ± 91 µmol/l. La valeur de la concentration moyenne de son était 10,5 ± 3 gm/dl et blanc cellule comte a 12 ± 2 × 10^9/mm³. Les trois plus communs des diagnostics au décès AVC (19,8%), septicémie (16,5%) et la maladie des voies respiratoires inférieure (8,1%). Maladies infectieuses 38,2% de tous les diagnostics. La longueur moyenne collective de séjour à l'hôpital (LOS) à mort était 6,8 ± 8,6 (variait de 15 jours de minutes-60). Proche de 27,4% des décès sont survenus entre 24 heures et trouble neurologique avait plus court séjour à l'hôpital (4,6 ± 6,3 jours), suivie de troubles endocriniens (6,8 ± 8,4 jours) et les maladies respiratoires (8,4 ± 5,6 jours) [*P*=0,001].

Conclusion: Hospital mortalité est élevée chez les personnes âgées. Accident vasculaire cérébral et maladies infectieuses sont principales causes de décès. Les efforts devraient viser à réduire les risques de maladies cardiovasculaires et d'amélioration sur le niveau d'hygiène personnelle et communautaire.

Mots clés: Mort, diagnostic, les personnes âgées, à l'hôpital

Introduction

Issue on ageing has become topical in most countries due to increase in number of people getting old.[1] This will have implication on hospital services as elderly people are admitted more frequently, stay longer, and are more likely to die on admission.[1] Ageing population has been associated with the change in epidemiologic pattern of diseases from infectious to increase in number of noncommunicable diseases such as cardiovascular diseases, osteoarthritis, diabetes, cancers, and degenerative diseases.[1,2] Projection by World Health Organization (WHO) is that by year 2050 population of elderly people would have increased by 60%, majority of who will be residing in industrially developing countries.[3]

Presently, there is little preparation for the emerging increase in noncommunicable diseases in most sub-Saharan Africa countries.[4] For example in Nigeria, the percentage of the population over 60 years of age was put at 5.13% in 1991 census figure.[5] There is presently no national policy on welfare or social security package for senior citizens with lack of geriatric hospitals in the country.[4] Thus, older patients are usually admitted into wards for younger adult in hospitals.[6-8]

Awareness of common causes of death is part of the basic steps to extend life and enhance healthy ageing. For the frail elderly patients, the hospital serves dual purposes; both as a place for therapeutic care and a place to die, especially for the "very elderly" and "terminally ill."[9,10] In-hospital mortality is affected by several factors for which physicians and hospital might have no control over. These include patient age, sex, nature, and severity of presenting illness, comorbidity, and socioeconomic ability to undertake diagnosis and treatment.[6-8,10]

In many countries in Africa, there is lack of statistics on birth and deaths due to unwillingness of the people to register this vital information while reliable in-hospital mortality data are scanty.[8,11] Unavailability of population-based statistics makes hospital-based studies a suitable alternative to provide correlates. This paper therefore examines in-hospital mortality among elderly patients with the hope to determine pattern and causes of death as well as duration of hospital stay before dying.

Materials and Methods

This is a prospective study on deaths involving patients 60 years and above managed at University of Ilorin Teaching Hospital (UITH). The study period was from January 2005 to June 2007. Information obtained included patient's demographic data, length of stay (LOS), and primary diagnosis. The causes of deaths were determined from diagnosis and review of clinical details. The UITH has 450 bed spaces and serves as a secondary and tertiary referral hospital for private and government clinics/hospital within Kwara and neighboring states. Admission into wards is either from the accident and emergency unit or outpatient clinics. For this study, all brought-in-deaths were excluded.

Statistical analysis

Computation of data was carried out using the Statistical Package for Social Sciences (SPSS) version 14. Frequency distributions of variables were obtained. Categorical variables are presented as percentages and continuous variables are presented as mean (SD). Differences in proportions were assessed by χ^2 tests and univariate one way analysis of variance (ANOVA) was used to contrast continuous variable (age and LOS in hospital). All *P* values were considered significant if less than 0.05.

Results

A total of the 1298 deaths occurred during the 30 months study period. Of these 297 occurred in persons 60 years and above giving crude death rate of

22.8%. The age at death varied from 60 to 100 years with mean of 68 ± 9 years [Table 1]. The deceased were 59% males and 41% females. Females were older than males with mean age of 69.7 ± 8.7 years compared to 68.1 ± 9.8 years for males (P=0.05). There was no significant difference in age at death among the various diagnoses. This is shown in Table 2. Although, more older patients died in the ward than in casualty, the difference was not statistically significant [Table 3]. Mean values of serum chemistry were sodium 137 ± 8 mMol/l, potassium 3.6 ± 1 mMol/l, 11 ± 8 mMol/L, and creatinine 126 ± 91 mmol/l. The value of mean haemogram concentration was 10.5 ± 3 gm/dl and white cell count was $12 ± 2 × 10^9/mm^3$.

The LOS at death varied from 15 minutes to 60 days with collective mean of 6.8 ± 8.6 days. There was significant difference in LOS among the different causes of mortality. Patients who died from neurologic cases had shortest hospital stay (4.6 ± 6.3 days), followed by endocrine disorders (8.4 ± 5.6 days) and respiratory diseases (8.4 ± 5.6 days). The people who died from cardiovascular disorders had longest hospital stay of 13 ± 6.9 days; while deaths resulting from renal disorders had mean LOS of 9.9 ± 10.3 days. Comparison of these values showed a statistical significance (P=0.014). Table 3 showed various causes of death and LOS. The mean LOS at death was grouped into three categories; deaths that occurred within 24 hours of admission, those within 2-7 days, and deaths after 7th day of hospitalization. Close to 27.4% of the mortality occurred within 24 hours of admission; 41.4% spent 2-7 days before they died, while 31% of the death occurred after the 7th day (P=0.001). There was no significant difference in mean values of the laboratory parameters and diagnoses among the deaths which occurred at the emergency unit and in the wards [Table 3].

Stroke was the most frequent diagnosis, accounting for 22.7% deaths. Sepsis and lower respiratory tract disorders resulted in 18.1% and 14.1% of deaths, respectively. Other causes of death were tuberculosis 7.7%, renal failure 6.9%, and hypertensive heart failure 5.8%. Less frequent causes of deaths were grouped as "others" and the group accounted for

Table 1: Baseline data of dead elderly patients

Characteristic	Number (%)	Mean age (SD)
Males	165 (56.5)	68.1 ± 9.8
Females	127 (43.5)	69.7 ± 8.7
Total	292	69.4 ± 10.6
Age range (years)		
60-64	95 (32.5)	
65-69	72 (24.7)	
70-74	49 (16.8)	
75-79	33 (11.3)	
≥80	43 (14.7)	

Table 2: System affected by causes of death and length of hospital stay

Factors	Neurol	Resp	Sepsis	Oncol	Endocr	GIT	CVS	Renal	SE	Trauma	P-value
Number	69	41	37	37	26	21	20	19	14	13	
(%)	(23.2)	(13.8)	(12.5)	(12.5)	(8.8)	(7.1)	(6.7)	(6.4)	(4.5)	(4.5)	
Mean age	67.3	69.4	69.1	69.2	68.9	68.7	70.1	68.3	66.6	67.6	0.6
(SD)	(12.4)	(6.6)	(17.1)	(8.6)	(10.2)	(7.1)	(10.2)	(8.1)	(5.3)	(5.5)	
LOS	4.6	8.4	9.1	8.9	8.4	9.9	13	9.9	6.6	6.8	0.014*
Mean (SD)	(6.3)	(6.9)	(6.9)	(12.9)	(5.6)	(6.9)	(10.3)	(8.4)	(7.6)	(8.4)	
Deaths (≤ 24 hours)	21	12	7	10	10	4	3	7	6.6		0.003*
(%)	(30.4)	(29.3)	(18.9)	(27.1)	(38.5)	(19.1)	(15.0)	(36.8)	(42.8)	(46.2)	
Deaths (2-7 days)	39	18	19	9	7	11	5	6	3	3	
(%)	(56.5)	(43.9)	(51.4)	(24.3)	(26.9)	(53.4)	(25.0)	(31.6)	(21.4)	(23.1)	
Deaths (≥ 7 days)	9	11	11	18	9	6	12	6	5	4	
(%)	(13.1)	(26.8)	(29.7)	(48.6)	(34.6)	(28.6)	(6s0.0)	(31.6)	(35.7)	(30.8)	

LOS = length of stay, Neurol = neurology, CV = cardiovascular, GIT = gastrointestinal, Resp = respiratory, Endocr = endocrine, Oncol = oncology, SE = surgical emergency. *Statistical significance

Table 3: Diagnosis at death (all-cause mortality)

Diagnosis	Number	Percentages
Stroke	59	19.8
Sepsis*	49	16.5
Lower respiratory diseases	26	8.7
Malignant neoplasm	25	8.4
Hypertensive heart failure	24	8.2
Tuberculosis*	21	7.1
Diabetic emergency	18	6.1
Chronic liver disease	12	4.4
Renal failure	11	3.7
Trauma/fall	13	4.4
Surgical emergency	14	4.7
Tetanus*	3	1.1
Meningoencephalitis*	3	1.1
HIV/AIDS*	3	1.7
Others	27	9.1
Total	297	100

*Infections/communicable diseases

Table 4: Comparison between death that occurred in emergency unit and wards

Characteristics	Emergency unit	Wards	P-value
Age	67.7 ± 6.9	69.3 ± 8.6	0.4
Gender			
Male	39	118	
Female	16	92	
Sodium (mMol/l)	136.9	137.2 ± 7.6	0.6
Potassium (mMol/l)	3.4 ± 0.8	3.7 ± 0.9	0.4
Urea (g/dl)	10.5 ± 4.4	10.5 ± 8.5	0.6
Random glucose (mMol)	8.8 ± 6.1	10.7 ± 6.9	0.3

8.1% of the total diagnoses. Infectious diseases accounted for 34% mortality. The breakdown of the diagnosis and causes of death are shown in Table 4.

Discussion

This descriptive study is on the pattern and causes of mortality among old patients admitted to UITH over 30 months period. Our result showed a crude mortality rate of 22.4%. Significant proportions of the deaths (27.4%) occurred within 24 hours of hospitalization with stroke and infectious disease being the two most common causes of deaths. Mortality rate was 22.4% in this study which though high, is comparable to results of similar international surveys.[9,12,13] Lamont *et al.* from USA found mortality rate of 20%,[9] Silva *et al.* in Brazil documented 16.4%[12] and Shoko and his colleagues from Japan reported 17.7% morality rate amongst older patients.[13] The wide differences in mortality rates among the different studies can be attributed to factors

such as degree of hospital specialization, patient's characteristics, and severity of illness at the time of presentation.[9,12,14] Financial constraint is also an important issue that could influence outcome of hospitalization in resource scarce nation like Nigeria.[6-8] There exists in many developing nations poor social service to cater for older citizens, as a result they are solely dependent on their children and relatives for upkeep and settlement of health bills.[5,6]

The collective mean age at death in this prospective study was 68 ± 9 years. This is lower than mean age from other works from both developing and developed nations.[9,11-15] It is plausible that the wide difference in age at death in those studies compared to ours is due to improvement in standard of living, better socioeconomic facilities, and higher life expectancy. Male deaths constituted 59% of mortality in our report and mean age at deaths in males was lower than in the females. There are evidences to suggest that hospital deaths are more in older males than females, and earlier observations had shown that females tend to live longer than males.[16,17] Nevertheless, at older age females reported greater number of morbidity and disability and use health-care facility more than males.[17] Several studies have been published on factors which influenced outcome of hospitalization in elderly people.[12-14] An important one is the ACME plus project from Europe,[18] which showed that mortality as an outcome in elderly patients does not necessarily depends on patient's age alone but rather on complexity of factors along with the admission diagnosis.[18]

In industrially advanced countries, the three leading causes of death in people 65 years and above are heart diseases, malignant neoplasm, and cerebrovascular accidents.[19,20] In this study, disease of neurologic system resulted in more deaths than any other systems. The same system accounted for close to a-quarter of deaths and with stroke being the single most common diagnosis at death, second and third common diseases were sepsis/infection and lower respiratory diseases, respectively. The mean age at death for neurological disease was 67.3 ± 12.4 years and is lower than collective mean age of 69.4 ± 10.6 years ($P<0.05$). Observation of this study is in line with those of previous ones which showed that stroke is becoming the greatest killer disease in Africa and often affects all age groups.[6,19,20] Change in lifestyle and dietary habits are two distinct features that have been particularly reported to account for the increase in number of cardiovascular disorder being experienced in most developing countries.[19,21] Two important community-based surveys from

rural South Africa found stroke to be responsible for 50% mortality and was the commonest killer between age 55 and 74 year and second after cancer in individuals above 75years of age.[22,23] The finding of 21% stroke mortality of this study is most likely a tip of iceberg, as several cases of stroke in Africa rarely get to hospital before deaths.[19] Plausible explanations for this include poor transportation system, limited access to health care and neurodiagnostic facility, deficient acute interventional therapy, dearth of medical experts, poor medical interpretation of symptoms of stroke in the community, and continued use of traditional and alternative healers.[19]

Sepsis/infectious and diseases of lower respiratory tract resulted in significant number of deaths in this series, a finding that is similar to what has been documented by other hospital-based studies in Nigeria.[6-8,20,24] Alteration in structure and functions of respiratory tract, fall in immunity level associated with ageing, poverty, high level of illiteracy, and poor sanitation are part of the reasons why communicable diseases are still a recurring theme and cause of preventable deaths in Africa.[6,7,25] When old people are sick they often become extremely weak and bedbound, which can lead to bedsores. If they stop to eat and drink water, dehydration may result, thereby necessitating insertion of intravenous line, urinary catheter, and nasogastric tube for feeding, all of which increase risk of infection. Senescence of the immune system and reduced level of personal hygiene from frailty also make older people vulnerable to sepsis and infection. It was therefore not surprising that those infectious diseases which are preventable accounted for 27.4% mortality in this study.

In conclusion, mortality amongst elderly patient admitted into this Nigerian University teaching hospital appears to be high. Cerebrovascular accidents and sepsis were the most common diagnoses at deaths, especially deaths within 24 hours of hospitalization. Communicable diseases such as sepsis, lower respiratory tract infection, and tuberculosis remain common infectious diseases that resulted in more death among elderly patients. There might be need for attending physician to pay more attention to older patients with signs and symptoms suggestive of stroke and sepsis. More efforts are needed to decrease the growing tide of cardiovascular risk factors being experienced in many developing countries consequent upon influence of western culture.

Part of the limitations of this study is its hospital-based nature and lack of postmortem reports to corroborate clinical diagnoses. Albeit, we believe our report is valid and useful for planning. Community-based studies on pattern of morbidity and mortality among the aged are needed to look at relevance of our finding within the context of a larger community.

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