ORIGINAL ARTICLE

Weekend versus weekday hospital deaths: Analysis of in-patient data in a Nigerian tertiary healthcare center

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Abstract

Aim: This study aims at comparing weekday deaths to weekend deaths of in-patients of a tertiary hospital in Nigeria.
Materials and Methods: This is a 10-year retrospective survey conducted at the Nnamdi Azikiwe University Teaching Hospital in which the death records of the hospital were accessed from the various wards and health records department to extract relevant data pertaining to the time of hospital death. Tests of statistical significance were done using Chi-square test at 95% confidence intervals.
Results: A total of 3934 deaths were recorded during the period of study. The ages ranged from a few hours to 94 years with a mean age of 38.5 years. The male to female ratio was 1.2:1. An average of 547 weekend deaths and 568 weekday deaths were recorded, giving a ratio of 0.96:1. A ratio of weekend to weekday death rate of 0.99:1 and 0.93:1 for the males and females, respectively was noted. The labor ward, followed by the intensive care unit (ICU) had the highest weekend to weekday death ratio of 1.72:1 ($P = 0.0461$) and 1.41:1 ($P = 0.1440$), respectively. Weekend deaths were less in the other wards, with the gynaecological ward having the least ratio of 0.63:1 ($P = 0.7360$).
Conclusion: The rate of hospital deaths was generally found not to vary significantly over the weekends and weekdays in the hospital except for the labor ward which had significantly higher weekend to weekday death rates of 1.72:1. There is therefore need for confidential enquiry into the causes of hospital deaths, especially in the labor ward, in order to identify and prevent avoidable deaths.

Key words: Hospital deaths, in-patients, weekend deaths

Date of Acceptance: 15-Feb-2013

Introduction

The optimal source of information in the time of death in populations is vital registration data based on medical certificates of time and cause of death, issued by physicians.[1] Such information can also be obtained from the medical records of the hospitals. In Nigeria as well as in many developing countries, deaths are usually recorded mainly in the secondary and tertiary hospitals, hence information on deaths are not adequately reported.

Medical records of individuals who die in the hospital may not contain the actual time of death because in several cases, the time documented may be the time of certification of death by the physician. However, the discrepancy is not usually much and more so, the dates of death are usually recorded appropriately.[1]

Studies have revealed the peak time of hospital deaths to be after regular work hours and weekends.[2-6] Public holiday periods have also been implicated as a period of higher hospital death rates.[5] Poor communication between doctors, inadequate handovers at night and delays in contacting consultants have been implicated in some reviews to influence the rate of hospital deaths after

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Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/1119-3077.116900

PMID: *******

regular work hours.[7] Highly critical report also exposed substandard decision making and a lack of involvement by senior clinical staff in the treatment of patients who died shortly after being admitted as causes of higher weekend death rates.[7]

In Nigeria, there is paucity of data on the time of hospital deaths and factors that may influence such. This study therefore aims at identifying the variations in the time of in-patient hospital deaths and the distribution of hospital death of patients over a 10 year period. The findings from this study on the prevailing time-specific mortality patterns would have important implications for current and future health priorities in Nigeria and in the monitoring and evaluation of health programs.

Materials and Methods

This is a 10 year retrospective descriptive epidemiological study conducted at the Nnamdi Azikiwe University Teaching Hospital, Nnewi from January 1, 1998 to December 31, 2007. Nnewi is a semi-urban town and the second largest city in Anambra State, Southeastern Nigeria. Nnamdi Azikiwe University Teaching Hospital (NAUTH) is a 335-bed tertiary referral hospital that is conveniently located near the major business areas of Southeastern Nigeria. It has 23 clinical departments and provides services for both medical undergraduates and post-graduates and a referral center serving Anambra, Imo, Delta, Enugu, and Abia states, Nigeria. The death records of the hospital were accessed from the various wards and health records department to extract relevant data in the time of hospital death, as well as socio-demographic characteristics, year, and place of death. The time of death recorded is the time the in-patient was certified dead by the doctor on duty. The data obtained were analyzed using Epi info software (version 15.0) and represented in frequency tables and percentages. Tests of significance were done using Chi-square test at 95% confidence interval.

Results

The results are presented in part in Tables 1-7. A total of 3934 deaths were recorded during the period of study. The ages ranged from a few hours to 94 years with a mean age of 38.5 years. The predominant age group was that of 10 years and below, 893 (23.8%), followed by 41 to 50 years, 496 (13.2%). The least was age 90 years and above, 19 (0.5%). Of these patients, 2162 (55.0%) were males and 1772 (45.0%) females, giving a male to female ratio of 1.2:1. The highest number of deaths was recorded in the male medical ward, 1085 (27.6%), followed by the female medical ward, 858 (21.8%) and the special care baby unit, 688 (17.5%). The ward with the least number of mortalities recorded was the gynaecological ward which recorded 10 (0.3%) deaths during the study period. Deaths during weekends and weekdays in the wards followed a similar frequency pattern as the total deaths. The highest number of deaths was recorded in 2007; 881 (22.4%) followed by 2006; 579 (14.7%) while the least was recorded in 1998, 202 (5.1%). The same trend followed for the total number of weekend and weekday deaths.

An average of 547 deaths were recorded for the weekend days each and 568 for the weekdays each over the study

Table 1: Age distribution of patients [*N*=3760]

Age group [In years]	Number	Percentage
≤10	893	23.8
11-20	176	4.7
21-30	426	11.3
31-40	461	12.3
41-50	496	13.2
51-60	438	11.6
61-70	437	11.6
71-80	292	7.8
81-90	122	3.2
≥91	19	0.5
TOTAL	3760	100

Table 2: Sex Distribution of patients

Sex	Time of death				Total	
	Weekend		Weekday		Number	%
	Number	%	Number	%		
Female	482	27.2	1290	72.8	1772	100
Male	612	28.3	1550	71.7	2162	100
TOTAL	1094	27.8	2840	72.2	3934	100

Table 3: Distribution of patients by ward of admission

Ward	Time of death				Total	
	Weekend		Weekday		Number	%
	Number	%	Number	%		
MMW	323	29.8	762	70.2	1085	100
FMW	237	27.6	621	72.4	858	100
SCBU	179	26.0	509	74.0	688	100
Casualty	85	24.0	269	76.0	354	100
PAED	64	26.2	180	73.8	244	100
MSW	70	29.5	167	70.5	237	100
FSW	50	25.4	147	74.6	197	100
CHER	27	25.7	78	74.3	105	100
ICU	26	36.1	46	63.9	72	100
Labour	22	40.7	32	59.3	54	100
OBS	9	30.0	21	70.0	30	100
Gynae	2	20.0	8	80.0	10	100
TOTAL	1094	27.8	2840	72.2	3934	100

ICU=Intensive care unit, MMW=Male medical ward, FMW=Female medical ward, SCBU= Special care baby unit, PAED=Paediatric ward, MSW=Male surgical ward, FSW= Female surgical ward, CHER=Childrens emergency ward

Table 4: Distribution of patients by year of death

Year	Time of death												Total	
	Weekend						Weekday							
	Male		Female		Total		Male		Female		Total			
	No	%	No	%	No	%	No	%	No	%	No	%		
1998	27	13.4	24	11.9	51	25.3	82	40.5	69	34.2	151	74.7	202	100
1999	30	14.7	23	11.3	53	26.0	83	40.7	68	33.3	151	74.0	204	100
2000	39	14.9	45	17.2	84	32.1	101	38.5	77	29.4	178	67.9	262	100
2001	53	16.2	38	11.6	91	27.8	132	40.4	104	31.8	236	72.2	327	100
2002	42	13.5	43	13.8	85	27.3	130	41.8	96	30.9	226	72.7	311	100
2003	70	17.9	35	9.0	105	26.9	156	40.0	129	33.1	285	73.1	390	100
2004	49	15.4	40	12.5	89	27.9	134	42.0	96	30.1	230	72.1	319	100
2005	73	15.9	58	12.6	131	28.5	170	37.0	158	34.4	328	71.5	459	100
2006	91	15.7	66	11.4	157	27.1	222	38.3	200	34.5	422	72.9	579	100
2007	138	15.7	110	12.5	248	28.1	340	38.6	293	33.3	633	71.9	881	100
T0tal	612	15.6	482	12.2	1094	27.8	1550	39.4	1290	32.8	2840	72.2	3934	100

Table 5: Average weekend and weekday death distribution by sex

Sex	Time of death				Ratio of weekend to weekday deaths
	Weekend		Weekday		
	Number	Average	Number	Average	
Female	482	241.0	1290	258.0	0.93
Male	612	306.0	1550	310.0	0.99
Total	1094	547.0	2840	568.0	0.96

Table 6: Average weekend and weekday death distribution by ward of admission

Ward	Time of death				Ratio of weekend to weekday deaths
	Weekend		Weekday		
	Number	Average	Number	Average	
MMW	323	161.5	762	152.4	1.06
FMW	237	118.5	621	124.2	0.95
SCBU	179	89.5	509	101.8	0.88
Casualty	85	42.5	269	53.8	0.79
PAED	64	32.0	180	36.0	0.88
MSW	70	35.0	167	33.4	1.05
FSW	50	25.0	147	29.4	0.85
CHER	27	13.5	78	15.6	0.87
ICU	26	13.0	46	9.2	1.41
Labour	22	11.0	32	6.4	1.72
OBS	9	4.5	21	4.2	1.07
Gynae	2	1.0	8	1.6	0.63
Total	1094	547.0	2840	568.0	0.96

ICU= Intensive care unit, MMW= Male medical ward, FMW= Female medical ward, SCBU= Special care baby unit, PAED=Paediatric ward, MSW=Male surgical ward, FSW=Female surgical ward, CHER=Childrens emergency ward

period. This gives a ratio of average weekend deaths to average weekday deaths of 0.96:1. This difference was not statistically significant ($P > 0.05$). There were more male and female deaths during the weekdays than the weekends, giving a ratio of weekend to weekday death of 0.99:1 and 0.93:1 for the males and females, respectively. These differences were not found to be statistically significant ($P = 0.6734$).

Table 6 shows the average deaths of each ward for the weekends and weekdays. The average weekend deaths were more in the male medical ward, male surgical ward, intensive care unit, labor ward, and obstetrics ward. The labor ward, followed by the intensive care unit had the highest weekend to weekday death ratio of 1.72: 1 and 1.41:1, respectively. Weekend deaths were less in the other wards, with the gynaecological ward having the least ratio of 0.63:1.

Table 7 shows the average weekend and weekday deaths per year. There was generally less average number of weekend to weekday deaths over the period, except in 2000 where there were more weekend deaths with a weekend to weekday average death ratio of 1.18:1.

Discussion

The age range of the patient was from a few hours to 94 years, with a mean age of 38.5 ± 36.9 years. Inclusion of deaths from the newborn unit may account for the wide variation observed.

Generally, this study revealed less weekend to weekday deaths, with a ratio of average daily deaths in the weekends to weekdays of 0.96:1. This higher ratio of weekend to weekday deaths is in contradistinction with findings from other studies done in Europe and Australia.[1-7] This discrepancy may be due to difference in attitude and cultures of people in Africa, particularly in Nigeria when compared to Europe and Australia, especially with regards to time of hospital presentation and weekend hospital attendance. Over the period of

Table 7: Average weekend and weekday death distribution by year of death

Year	Time of death				Ratio of weekend to weekday deaths
	Weekend		Weekday		
	Number	Average	Number	Average	
1998	51	25.5	151	30.2	0.84
1999	53	26.5	151	30.2	0.88
2000	84	42.0	178	35.6	1.18
2001	91	45.5	236	47.2	0.96
2002	85	42.5	226	45.2	0.94
2003	105	52.5	285	57.0	0.92
2004	89	44.5	230	46.0	0.97
2005	131	65.5	328	65.6	1.0
2006	157	78.5	422	84.4	0.93
2007	248	124.0	633	126.6	0.98
T0tal	1094	547.0	2840	568.0	0.96

study there was generally a higher average weekday deaths for each year, except 2000 and 2005, where there was a ratio of weekend to weekday deaths of 1.18:1 and 1:1, respectively. However, this slightly increased risk of weekday deaths in the years under study was not found to be statistically significant ($P > 0.05$).

The ratio of weekend to weekday deaths among the males and females was found to be 0.99:1 and 0.93:1, respectively. These differences were not found to be statistically significant ($P = 0.6734$). The average daily deaths in the labor ward was found to be significantly higher in the weekends than in the weekdays with weekend to weekday ratios of 1.72:1 ($P = 0.0461$). This finding however is in keeping with findings from surveys done in Australia,[2] where patients who were admitted during the weekends had 20% chance of death as opposed to weekdays that had 14%.

There was less average weekend to weekday deaths in the gynaecological ward, with a ratio of 0.63:1. This difference was however not statistically significant ($P = 0.7360$).

Conclusion

This study has revealed a slightly increased risk of hospital deaths in the weekdays when compared to weekends over the years and for each sex. Also, these deaths were generally found not to vary significantly over the weekends and weekdays in the wards, except the labor ward which had significantly higher weekend death rates. Confidential enquiry of deaths in hospitals is recommended as it will help identify the actual causes of deaths, the factors influencing these death rates as well as proffer possible solutions.

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How to cite this article: Nwosu BO, Eke NO, Obi-Nwosu A, Osakwe OJ, Eke CO, Obi NP. Weekend versus weekday hospital deaths: Analysis of in-patient data in a Nigerian tertiary healthcare center. Niger J Clin Pract 2013;16:501-4.

Source of Support: Nil, **Conflict of Interest:** None declared.