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Short Communication

Mortality audit of medical patients at armed forces hospitals

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ABSTRACT

The mortality statistics of the medical patients at our tertiary care hospitals are sparse and lacking. We studied the mortality characteristics of the patients admitted to medical wards and intensive care unit at two hospitals based on the available fatal documents. Our objectives include analysis of the cause of death, duration of stay and presence of sepsis. The deceased (103 males, 47 females) had a mean age of 64.6 ± 15.5 yrs and mean duration of stay 7.1 ± 12.3 days. Infections and sepsis syndrome (33%), respiratory (17%), neurological (15%) and cardiovascular disorders (10%) were the top four causes of the mortality. Comorbid ailments were present in 71% of the deceased and the ventilator was used in 39% of them prior to the death. Age of the patients did not show any correlation with the duration of hospital stay ($P = 0.8322$). Infections and sepsis syndrome are the major reasons of death in medical patients. Mortality audit helps in identifying the prevalent causes of death in the hospital.

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Introduction

Medical science has evolved tremendously in the last few decades, resulting in improved life expectancy. The increased life expectancy led to rise in the prevalence of chronic medical disorders like diabetes and hypertension.¹ Mortality is an inevitable component of hospital practice and patient outcomes. The mortality characteristics and the audit give a myriad of information.² This helps in identifying the trends of mortality and generates further ideas to improve the lacunae

in the functioning of the hospital. Mortality audit of the mortality data is essential for further improvement of the hospital services and helps in proper allocation of the resources.

The spectrum of patients admitted to a tertiary level hospital is different from the peripheral hospital. Hence, the mortality rate in a tertiary centre is higher than the peripheral hospital.³ Extensive literature search did not reveal the mortality patterns of medical patients pertaining to big tertiary care civil and military hospitals. The available reports have analyzed mortality characteristics pertaining to a particular

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disease or complication.⁴ Hence, we conducted this study to identify the mortality characteristics of the patients admitted to medical wards and intensive care unit at two service hospitals.

Material and methods

We conducted this retrospective study with mortality records pertaining to the patients admitted to the acute medical ward and ICU at two tertiary care service hospitals. The authors have full access to the death summaries of 150 cases spread over five years (2010–2014) and the data retrieved includes the demographic characteristics of the deceased, time and cause of death, comorbid ailments, use of ventilator during the management and the presence of sepsis.

Our primary objective was to identify the primary cause of the death amongst patients admitted to the medical wards. The primary cause of the death is assessed after reading the death summary and categorized into nine systemic etiologies. They include cardiovascular, neurological, respiratory, gastrointestinal, infective, neoplastic, renal, endocrine and miscellaneous categories. We accorded the category based on the clinical presentation and the main cause of death. For example, a patient with tubercular meningitis would be classified as having a neurological disease rather than infectious disease. Type II respiratory failure due to pneumonia gets a label of respiratory disease rather than an infectious disease. A diabetes patient presenting with chest pain and acute myocardial infarction would be classified into cardiovascular causes of death, even if the patient had evidence of diabetic ketoacidosis. Patients with no localized source of infection associated with sepsis and MODS have been classified under infectious category. Other known bacterial, viral, protozoal, fungal infections also were included in this category.

Our secondary objectives include studying the duration of hospital stay, presence of comorbid ailments, use of the ventilator and the presence of sepsis syndrome. Comorbid ailments were noted based on the case records and include hypertension, diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD), coronary artery disease (CAD),

chronic liver disease (CLD), cerebrovascular accident (CVA), chronic kidney disease (CKD), rheumatoid arthritis and hypothyroidism.

We present the data using descriptive statistics pertaining to the demographic and clinical parameters. Categorical variables were presented by frequency and quantitative data using the mean, standard deviation and chi-square test. Correlation analyses were carried out using the Spearman's correlation test. The statistical analysis was done using Graph pad Prism Software, Version 6 (Graph Pad Prism Software, USA) and a p value of less than 0.05 was considered as significant in all the tests.

Results

The data pertaining to the 150 mortality records (103 males, 47 females) were included in the study. They consist of eight serving personnel and the remaining 142 includes dependents and ex-servicemen. The mean age of the patients at the time of death was 64.6 ± 15.5 yrs, and is not different between the males (64.9 ± 16) and females (63.9 ± 14.7). The majority of the deceased were aged above 60 yrs and the age distribution is given in Fig. 1. The patients were admitted for a mean duration of 7.1 ± 12.3 days with a range varying between a few hours to more than 4 months.

The top four causes of mortality include infectious diseases (33%), respiratory (24%), neurological (15%) and cardiovascular disorders (10%). The remaining 18% are shared by renal, endocrine, gastrointestinal and miscellaneous disorders. The two most common causes of mortality in each category are cardiac (acute coronary syndrome, dilated cardiomyopathy), neurological (cerebrovascular accident, meningoencephalitis), respiratory (COPD, pneumonia), gastrointestinal (cirrhosis, pancreatitis), neoplastic (carcinoma lung, non hodgkins lymphoma), renal (chronic kidney disease, pyelonephritis) and endocrine (diabetic ketoacidosis, hyperosmolar nonketotic coma). Miscellaneous causes include snake bite, poisoning (aluminium phosphide), heat stroke and dermatomyositis. We stratified the patients as per the age and the common etiologies leading to the mortality as shown in Table 1. Infections are the commonest cause in all age groups followed

Fig. 1 – Age distribution of the deceased.

Table 1 – Age-wise distribution of the mortality.

Age	Total number	Rank wise aetiology (Total number & system)		
		1st	2nd	3rd
≤ 40 yr	12	6 (Infections)	3 (Endocrine)	3 (Others)
41–60 yr	38	16 (Infections)	6 (Respiratory)	5 (Neurological)
61–80 yr	72	22 (Infections)	14 (Respiratory)	13 (Neurological)
≥ 81 yr	28	6 (Infections)	5 (Respiratory)	3 (Cardiac)

Table 2 – Distribution of co-morbid ailments.

Comorbidity	Age of the deceased (yr) ^a			
	≤ 40 (n = 12)	41–60 (n = 38)	61–80 (n = 72)	≥ 81 (n = 28)
Hypertension		8	26	9
Diabetes mellitus	3	16	23	7
COPD		2	14	4
Rheumatoid arthritis		1		
Hypothyroidism		3	1	1
Chronic liver disease	2	2	2	
Cerebrovascular accident		4	6	6
Coronary artery disease	1	2	15	7
Chronic kidney disease	1	3	3	

^a Total number does not match due to the presence of multiple comorbidities.

by respiratory disorders and endocrine disorders in younger patients.

A total 107 (71%) patients had one or more comorbid ailments at the time of admission. The distribution of the comorbid ailments according to the age of the patient is shown in Table 2. The most common comorbid ailments include diabetes mellitus (33%), hypertension (29%), coronary artery disease (16%), chronic obstructive pulmonary disease (13%)

and cerebrovascular accident (11%). The mean duration of hospital stay in patients with and without comorbidities (7.8 ± 12.4 , 5.5 ± 4.7 days respectively), was not different ($P = 0.3186$). Ventilator support was used in 58 patients and sepsis syndrome was evident in 77 cases prior to their death. The correlation between the age of the deceased and the duration of hospital stay did not show any significance as shown in Fig. 2 ($P = 0.8322$). The time of death is divided into

Fig. 2 – Correlation between the age of the patient and hospital stay.

Fig. 3 – Profile of the time of death.

four quadrants of the day as shown in Fig. 3. There is no difference with regard to the frequency of deaths based on the time ($P = 0.5539$).

Discussion

Our findings have shown that infectious diseases and sepsis syndrome still accounts for the majority of deaths in medical patients. No similar study exists from armed forces or any tertiary hospital in India for comparison of our data. A recent study about the audit of the autopsy data from the armed forces shows that infectious diseases were the commonest cause of death.⁵ A study analyzing the patterns of mortality in cancer patients also showed a higher rate of infectious causes as the leading cause of mortality.⁶ We cannot compare other data because of the differences of the study methodology and lack of autopsy data in the majority of our patients. The majority of the deceased were beyond 60 yrs of age in line with the prevalent life expectancy of our country. The surprising observation is the similar age profile of the males and females despite the known fact of higher life expectancy in the latter. The etiological spectrum also did not differ in different age groups as shown in Table 1. Young patients had endocrine disorders including severe diabetic ketoacidosis and the respiratory disorders also account for a majority of the mortality. Though cardiac and neurological disorders contribute towards mortality, the same have not been adequately represented in our study.

The majority of the deceased had presence of one or more comorbid ailments aggravating the primary condition. However, the data does not suggest any significant differences in the mortality characteristics between the patients with and without comorbidities. Diabetes and Hypertension are the common accompaniments in the elderly population that aggravate the underlying illness leading to increased risk of mortality. Advanced age itself is an indicator for a prolonged stay in the hospital, but our data did not show any relation between the age of the patient and duration of hospital stay⁷.

This could be due to the fact that the majority of our patients was referred from other hospitals and we did not include this data in the duration of hospitalization. The use of the ventilator was observed in only one third of the patients prior to their death. This could be due to fact that most of our acute wards are not equipped with ventilators and patients die before transitioning to the intensive care unit. Ventilator was used in most of the patients in ICU and the clinical settings include hypoxaemia, airway protection and respiratory failure. Previous data suggest that the mortality in ICU is related to the duty shifts and nocturnal times.⁸ However, our data do not suggest the same, though there are numerically more deaths during the working hours rather than the non-working hours.

In our study, respiratory ailments, including COPD exacerbation are major systemic contributors of the mortality. Unfortunately our records did not show the percentage of people who have received the vaccination against the influenza and pneumococcal infection. Our findings have important implications in the clinical practice, especially in the armed forces. Vaccines are available for the prevention of influenza and pneumonia in high risk individuals.⁹ A comprehensive policy on adult vaccination for the armed forces population is essential, in order to prevent the exacerbation of respiratory ailments in dependent population.^{10,11}

The strengths of our study include the data derived from two tertiary level care centres of the armed forces which fairly represent the situation elsewhere. Our study has certain limitations. Firstly, the data does not pertain to the entire medical patients admitted to the hospitals. Secondly, we have no information about the number of deaths which have been summarized by the other medical specialists or superspecialists at the hospital. This could have contributed to the small number of available records in our study. Thirdly, our data may not be similar to the spectrum of cases at zonal hospitals due to the referral bias of difficult cases at the tertiary level care hospitals. Lastly, the inclusion of patients with no documented source of infection could have led to the overestimation of infectious aetiology.

To conclude, infections and respiratory ailments are the major contributors of the mortality in medical patients. Similar data from other hospitals and specialists shall give a true assessment of the trends of mortality in service hospitals.

Conflicts of interest

The authors have none to declare.

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