

Retrospective Analysis of Hospital Deaths in a Rural Tertiary Care Hospital

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Abstract

Death is an inevitable aspect of life, impacting every individual universally. While it cannot be avoided, efforts can be made to delay it and enhance life expectancy. This retrospective study analysed 860 hospital deaths in the year 2022 at Great Eastern Medical School & Hospital, focusing on various epidemiological and chronological factors. The highest number of deaths occurred in the age group of 60- 70 years, while the lowest number of deaths were recorded in the age group of 10-20 years. A higher incidence of deaths was observed in medical branches compared to surgical branches. The common diagnoses leading to death were cerebrovascular accidents and chronic kidney disease, with septic shock and multiorgan dysfunction identified as the predominant cause of death.

Keywords: Death, Cerebrovascular accident, Sepsis, multiorgan dysfunction.

Introduction

Death is an inevitable and universal aspect of human existence. While it cannot be avoided, efforts can be made to delay it and enhance life expectancy. Mortality statistics play a crucial role in understanding the health status, disease patterns, and aetiologies prevalent in society. A well-documented death dataset is essential for identifying leading causes of death and associated comorbidities, aiding in the formulation and strategic implementation of national preventive programs for various diseases such as malaria, tuberculosis, hypertension, and diabetes.

Death is defined as the permanent and irreversible cessation of circulation, respiration, and the absence of elicitable reflexes. This definition extends to the death of individual cells and tissues within the body.¹ The death rate in India witnessed an increase of 2.1 deaths per 1,000 inhabitants in 2021 compared to the previous year, reaching a peak of 9.45 deaths per 1,000 inhabitants.²

Noncommunicable diseases (NCDs) are responsible for 74% of all global deaths, with 41 million people succumbing to them annually. Cardiovascular diseases, cancers, chronic respiratory

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diseases, and diabetes collectively account for over 80% of premature NCD deaths. Lifestyle factors such as tobacco use, physical inactivity, alcohol consumption, unhealthy diets, and air pollution significantly contribute to the risk of NCD-related deaths.³

Comorbidities, particularly diabetes mellitus and hypertension, play a substantial role in mortality. Individuals with multiple coexisting medical conditions are termed multimorbid. In India, hypertension, diabetes mellitus, dyslipidaemia, and cardiac issues are prevalent contributors to morbidity and mortality.

Materials and Methods

This retrospective study examined 860 deaths that occurred in Great Eastern Medical School Hospital in the year 2022. The analysis included variables such as age, sex, days post-admission when the patient died, time of death, causes of death within the first day of admission, month-wise admissions versus deaths, department-wise distribution of deaths in medical and surgical branches, total medical versus total surgical deaths, mortality statistics for various surgical branches (both preoperative and postoperative), statistics on different comorbidities, provisional diagnosis, immediate cause of death, and medicolegal case deaths with disease types. Cases categorized as brought dead were excluded from the study due to the inability to determine a proper cause of death.

Results and Discussion

A total of 860 deaths were analysed in the year 2022, revealing important insights into mortality patterns in the studied population. The findings are discussed below:

The highest number of deaths occurred in the age group of 60-70 years ($n = 176$), while the lowest number was recorded in the age group of 10-20 years ($n = 19$). This trend is consistent with the vulnerability of older individuals to diseases. The ratio of deaths in the first 40 years of life (0-40 years) to the next 40 years (40-80 years) was 1:3.15, indicating a significant increase in mortality after the age of 40. Factors such as fatal diseases, multimorbidities, decreased immunity, and limited rural tertiary care facilities

may contribute to higher mortality in the 40-80 age group. Research studies from Priyanka Patel suggested that morbidity is more in older adults which in turn may later to mortality.⁴ The ratio of deaths between 0-10 years and 10-20 years was 2.78:1. Neonatal deaths accounted for a substantial portion, with 84.90% occurring in the first year, 75.5% in first month of life. Causes included hyaline membrane disease, neonatal jaundice, sepsis and prematurity, emphasizing critical neonatal care.

Males accounted for 62.22% of the total deaths, surpassing females (37.78%), even though number of admissions were almost same in comparison (Males - 19932 vs Females -19541).⁵ This gender difference in mortality could be attributed to stressors like financial challenges, occupational hazards, accidents, and unemployment along with higher rates of cigarette smoking and alcohol consumption in rural areas.

A noteworthy proportion of deaths (40.11%) occurred within the first day of hospital admission, possibly due to the severity of the disease and delayed hospital arrival.

Among the acute diseases, fevers ($n=39$) dominated the first day deaths, possibly due to people neglecting fevers in rural areas and taking treatment from quacks, and finally succumbing to them after attending to a tertiary care hospital. Most deaths (61.74%) took place within 3 days of hospital admission, highlighting the severity of diseases and the time required for the body to respond to treatment. A high percentage (80.58%) of deaths occurred within one week, pointing towards the critical nature of the health conditions at the time of admission.

The highest number of deaths was observed in August, followed by November, while the lowest number occurred in February. Seasonal variations may be attributed to factors such as infectious diseases, road traffic accidents, and weather-related conditions. More deaths were recorded during the rainy season (40.11%), possibly due to poor hygiene, inadequate drainage leading to water stagnation, increased mosquito-borne illnesses, respiratory tract infections, and higher incidence of road traffic accidents on slippery roads.

Highest number of deaths were recorded in the time between 9:00A.M - 5.00 P.M ($n=292$) followed by

207 deaths in the time between 5:00P.M. - 11:00P.M. Deaths were lower between 3:00 A.M. to 6:00A.M. (n=91), Contrary to popular belief, that deaths occur more during this time of day due to absence of medical personnel. Even though the monitoring by medical personnel is high from 6:00A.M to 11:00P.M, more no of deaths (75%) happened in this time.⁶

More deaths (40.11%) occurred during the rainy season, followed by winter (30.81%) and summer (29.07%). Poor hygiene and inadequate drainage in rural areas during the rainy season may contribute to water stagnation, leading to an increase in mosquito-borne illnesses, respiratory tract infections, snake bites, and road traffic accidents due to slippery roads.

Medical branches accounted for a higher percentage of deaths (88.16%) compared to surgical branches (11.84%). General medicine recorded the highest number of deaths (n=177), followed by Cardiology(n=124), Neurology (n=102), Respiratory medicine(n=100), Emergency medicine(n=90), Nephrology(n=87), Paediatrics (n=53), and Neurosurgery(n=50). Neurosurgery and general surgery (n=20) in surgical branches recorded higher deaths, often associated with severe brain disease and surgical pathology.

Out of 12,917 surgeries conducted, post-surgical deaths were relatively low (n=22, 0.17%). Pre operatively more deaths were recorded in neurosurgery (n=45) followed by General surgery (n=14). Post operatively six deaths are seen in general surgery followed by neurosurgery (n=5). Among the 50 neurosurgery department deaths, 45 deaths were pre-operative in nature indicating severe brain disease and bad prognosis of the patient.

Hypertension (n=162), diabetes mellitus (n=79), and carcinomas (n=25) were the most prevalent comorbid conditions. These factors likely contributed to the complexity of cases and increased mortality rates.

A total of 801 medicolegal cases were recorded, with 59 cases proving fatal. Traumatic brain injury (n=33) and poisonings (n=14) were common

medicolegal cases handled by the Emergency Medicine department.

In this study, highest number of cases were diagnosed as Cerebro Vascular Accident (n=91)^{5,7} followed by Multi Organ Dysfunction Syndrome (n=60), Chronic Kidney Disease (n=55), Shortness of Breath under evaluation (n=54), Fevers (n=51), Acute Kidney Injury (n=43), Pneumonias (n=39), Myocardial Infarction (n=31), Head injury (n=33), Intracranial haemorrhages (n=33), Respiratory failure (n=28), Pulmonary oedema (n=25), Carcinomas (n=25), Preterm/Hyaline Membrane Disease (n=23), Coronary artery disease (n=20), Decompensated liver disease (n=19), Heart failure (n=16), altered sensorium under evaluation (n=16), Acute respiratory distress syndrome (n=14), Poisonings (n=14), cellulitis (n=11) etc as shown in Table no.4

In this study, leading causes of death that recorded were Sepsis with multiorgan dysfunction (n=224), Respiratory failure (n=89), Cardiogenic shock (n=74), Pneumonias (n=64), Head injury/Intracranial haemorrhages (n=64), Respiratory distress syndrome (n=59), Cerebro vascular accident (n=54), Myocardial infarction (n=32), Pulmonary oedema (n=25), Heart failure (n=21), Hypovolemic shock (n=16),

Metabolic Encephalopathy (n=14), metabolic acidosis (n=13), chronic kidney disease (n=11) etc as shown in Table no 5.

Sepsis with multiorgan dysfunction was diagnosed more often clinically, and few cases (n=21) were diagnosed after blood culture and sensitivity. Escheria coli was isolated as a predominant organism. The reason for less isolates could be due to the collection of samples after antibiotic dosage. It indicates the need for collection of blood samples from patients before giving antibiotics. Among the sepsis with MODS cases as cause of death, fever with thrombocytopenia (n=19), chronic kidney disease (n=15), acute kidney injury (n=15), chronic liver diseases (n=12), chronic kidney disease (n=11), Cerebro-vascular accidents (n=9) were dominant associated causes of death.

TABLE-1: AGE WISE MORTALITY ANALYSIS (n=860)

| AGE IN YEARS | NUMBER OF DEATHS | PERCENTAGE |
|--------------|------------------|------------|
| 0-10 | 53 | 6.16 |
| 10-20 | 19 | 2.20 |
| 20-30 | 42 | 4.88 |
| 30-40 | 84 | 9.76 |
| 40-50 | 136 | 15.81 |
| 50-60 | 168 | 19.53 |
| 60-70 | 176 | 20.46 |
| 70-80 | 148 | 17.20 |
| 80-90 | 34 | 3.95 |

TABLE-2: DURATION OF HOSPITAL STAY (n=860)

| DURATION | NUMBER OF DEATHS | PERCENTAGE |
|-------------|------------------|------------|
| <1DAY | 357 | 41.51 |
| 1DAY-3DAYS | 174 | 20.23 |
| 3DAYS-1WEEK | 162 | 18.83 |
| 1-2WEEKS | 109 | 12.67 |
| 2-4WEEKS | 48 | 5.58 |
| >4WEEKS | 10 | 1.16 |

TABLE-3: MORTALITY ANALYSIS OF SURGICAL BRANCHES (n=94)

| SURGICAL DEPARTMENT | CONDUCTED SURGERIES | PRE-OPERATIVE DEATHS | POST OPERATIVE DEATHS | TOTAL DEATHS |
|---------------------------|---------------------|----------------------|-----------------------|--------------|
| NEUROSURGERY | 367 | 45 | 5 | 50 |
| GENERAL SURGERY | 1431 | 14 | 6 | 20 |
| SURGICAL ONCOLOGY | 294 | 5 | 3 | 8 |
| SURGICAL GASTROENTEROLOGY | 241 | 4 | 2 | 6 |
| ORTHOPEDICS | 1173 | 1 | 3 | 4 |
| PLASTIC SURGERY | 201 | 2 | 1 | 3 |
| CTVS | 222 | 0 | 2 | 2 |
| UROLOGY | 1130 | 1 | 0 | 1 |
| ENT | 431 | 0 | 0 | 0 |
| OPHTHALMOLOGY | 5872 | 0 | 0 | 0 |
| GYNECOLOGY | 724 | 0 | 0 | 0 |
| OBSTRETICS | 763 | 0 | 0 | 0 |
| DENTAL | 63 | 0 | 0 | 0 |

Table 4 Provisional/final diagnosis(n=860)

| S . No | Diagnosis | No of cases | Percentage |
|--------|------------------------------|-------------|------------|
| | Central nervous system | | |
| 1 | Cerebro vascular accident | 91 | 10.58 |
| 2 | Head injury | 33 | 3.88 |
| 3 | Intracranial haemorrhages | 33 | 3.88 |
| 4 | Altered sensorium/evaluation | 16 | 1.86 |
| 4 | Meningitis/encephalitis | 6 | 0.69 |
| | Sub Total | 179 | |
| | Respiratory system diseases | | |
| 1 | Shortness of breath/evaluate | 54 | 6.27 |
| 2 | Pneumonias | 39 | 4.53 |
| 3 | Respiratory failure | 28 | 3.25 |
| 4 | Pulmonary oedema | 25 | 2.90 |
| 5 | Hyaline membrane disease | 23 | 2.67 |
| 6 | ARDS | 14 | 1.62 |
| 7 | COPD | 12 | 1.39 |
| 8 | Pleural effusion | 7 | 0.81 |
| 9 | Tuberculosis | 7 | 0.81 |
| 10 | Pneumothorax | 2 | 0.23 |
| | Sub Total | 211 | |
| | Cardiac diseases | | |
| 1 | Myocardial infarction | 31 | 3.6 |
| 2 | Coronary artery disease | 20 | 2.32 |
| 3 | Heart failure | 16 | 1.86 |
| 4 | Rheumatic heart disease | 11 | 1.27 |
| 5 | Chest pain under evaluation | 9 | 1.04 |
| 6 | Cardiomyopathy | 8 | 0.93 |
| 7 | Cardiogenic shock | 5 | 0.58 |
| 8 | Arrhythmias | 5 | 0.58 |
| | Sub Total | 105 | |
| | Gastrointestinal diseases | | |
| 1 | Decompensated liver diseases | 19 | 2.20 |
| 2 | Abdominal pain evaluation | 11 | 1.27 |
| 3 | Bowel obstruction | 6 | 0.69 |
| 4 | Intestinal perforation | 5 | 0.58 |
| | Sub Total | 41 | |
| | Renal diseases | | |
| 1 | Chronic kidney disease | 55 | 6.39 |
| 2 | Acute kidney disease | 43 | 5.00 |
| 3 | Dyselectrolytaemia | 5 | 0.58 |
| | Sub Total | 103 | |

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|----|--------------------------------|-----|------|
| | Others | | |
| 1 | Sepsis with MODS | 60 | 6.97 |
| 2 | Fever with thrombocytopenia | 51 | 5.93 |
| 3 | Carcinomas | 25 | 2.90 |
| 4 | Poisonings | 14 | 1.62 |
| 5 | Cellulitis | 11 | 1.27 |
| 6 | Neonatal sepsis, jaundice | 7 | 0.81 |
| 7 | Long bone fractures | 5 | 0.58 |
| 8 | Hypovolaemic shock | 4 | 0.46 |
| 9 | Metabolic acidosis | 4 | 0.46 |
| 10 | Burns | 4 | 0.46 |
| 11 | Metabolic encephalopathy | 4 | 0.46 |
| 12 | Diabetic ketoacidosis | 4 | 0.46 |
| 13 | Sickle cell anaemia | 3 | 0.34 |
| | Sub Total | 196 | |
| | Multiple provisional diagnosis | 25 | 2.90 |
| | Total | 860 | |

Table 5: Immediate Cause of death (n=860)

| S.no | Cause of Death | No. of cases | Percentage |
|------|---------------------------------|--------------|------------|
| 1 | SEPTICK SHOCK | 224 | 26.04 |
| 2 | RESPIRATORY FAILURE | 89 | 10.34 |
| 3 | CARDIOGENIC SHOCK | 74 | 8.60 |
| 4 | PNEUMONIA | 64 | 7.44 |
| 5 | HEAD INJURY/ SDH/IVH/SAH | 64 | 7.44 |
| 6 | RESPIRATORY DISTRESS SYNDROME | 59 | 6.86 |
| 7 | CEREBROVASCULAR ACCIDENT | 54 | 6.27 |
| 8 | MYOCARDIAL INFARCTION | 32 | 3.72 |
| 9 | PULMONARY OEDEMA | 25 | 2.90 |
| 10 | HEART FAILURE | 21 | 2.44 |
| 11 | HYPOVOLEMIC SHOCK | 16 | 1.86 |
| 12 | HYALINE MEMBRANE DISEASE | 16 | 1.86 |
| 13 | METABOLIC ENCEPHALOPATHY | 14 | 1.62 |
| 14 | VENTRICULAR TACHYCARDIA | 14 | 1.62 |
| 15 | METABOLIC ACIDOSIS | 13 | 1.51 |
| 16 | CHRONIC KIDNEY DISEASE | 11 | 1.27 |
| 17 | HYPOXIC ISCHEMIC ENCEPHALOPATHY | 9 | 1.04 |
| 18 | SEIZURES | 8 | 0.93 |
| 19 | PULMONARY ARTERIAL HYPERTENSION | 7 | 0.81 |
| 20 | PULMONARY TUBERCULOSIS | 7 | 0.81 |
| 21 | CARDIOMYOPATHIES | 7 | 0.81 |

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|----|---------------------------|-----|-------|
| 22 | FEVER+_ THROMBOCYTOPENIA | 6 | 0.69 |
| 23 | PLEURAL EFFUSION | 5 | 0.58 |
| 24 | MULTIPLE DIAGNOSIS | 5 | 0.58 |
| 25 | RHEUMATIC HEART DISEASE | 5 | 0.58 |
| 26 | CARCINOMA STOMACH | 4 | 0.46 |
| 27 | PULMONARY THROMBOEMBOLISM | 3 | 0.34 |
| 28 | PNEUMOTHORAX | 2 | 0.23 |
| 29 | SEPTIC ENCEPHALOPATHY | 2 | 0.23 |
| | Total | 860 | 99.87 |

Conclusions

- Patients aged 40 years and above face a significant increase in mortality, with death chances tripling after the age of 40. Neonates and infants in their first month and year of life, respectively, are particularly vulnerable.
- Male mortality rates surpass females, despite similar admission numbers.
- Deaths on the first day of admission are higher, emphasizing the severity of diseases or delayed hospital arrival. A substantial proportion of deaths occurs within three days of admission, highlighting the critical nature of these cases.
- More deaths occurred during the daytime 6 AM to 11 PM.
- Rainy seasons witness a higher number of deaths compared to other seasons.
- Cerebrovascular accidents are the predominant diagnosis.
- Sepsis with multiorgan dysfunction emerges as the leading cause of death.

These conclusions provide critical insights into the demographic and temporal patterns of mortality, departmental risks, and common diagnoses. The identification of leading causes of death, particularly sepsis with multiorgan dysfunction, underscores the importance of targeted interventions and proactive healthcare strategies to improve patient outcomes. The findings presented here can guide healthcare professionals and policymakers in enhancing preventive measures and optimizing healthcare delivery.

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References

1. Dr.K.S.N. Narayan Reddy, OP Murthy. The Essentials of Forensic Medicine & toxicology, 35rd edition, Hyderabad, Jaypee brothers medical publishers (P) ltd; 2022, P.99.
2. Deathrate in India 2021, <https://www.statista.com/statistics/580178/death-rate-in-india/>, accessed on jan12th, 2024.
3. World health organization. Noncommunicable diseases. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>, September 2023, accessed on January 12th, 2024.
4. Priyanka Patel, T. Muhammad, Harihar sahuo. Morbidity status and changes in difficulty in activities of daily living among older adults in India: A panel data analysis. PLOS ONE, 2022; 1-16.
5. Kalkonde et al. Stroke Is the Leading Cause of Death in Rural Gadchiroli, India.A ProspectiveCommunity-Based Study. <http://stroke.ahajournals.org/> May 24, 2015. accessed on January 12th, 2024.
6. Jeeveswararao Bagadi, Srinivasulu Pothireddy, Sujana Kumar Mohanthy. Analysis of Hospital Deaths at Tertiary Care Teaching Hospital. Indian Journal of Forensic Medicine & Toxicology, April-June 2020; Vol. 14(2): P 8-11.
7. Sachin Chourasia, Shivani Dhaka, Ravi Rautji, KV Radhakrishna. Epidemiological Profile of In-Hospital Deaths in a Tertiary Health Care Centre: A 3-Year Retrospective Study in Western Maharashtra. Journal of Medical Academics, 2020 July; Volume 3(2): 38-42.