

Patterns and Predictors of Mortality in Elderly Patients Admitted at Tertiary Care Hospital across Medical Wards

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Abstract

Background: The global population aged ≥ 60 years is projected to reach 1.5 billion by 2050, presenting unprecedented challenges for healthcare systems worldwide. Elderly patients exhibit unique mortality patterns due to physiological senescence, multimorbidity, and altered pharmacokinetics. This study comprehensively analyzes the determinants of in-hospital mortality among elderly patients in a high-volume tertiary care center in South Asia. **Material and Methods:** We conducted a retrospective observational study of 2,662 elderly inpatients (≥ 60 years) admitted between January 2023 and December 2024, including 500 patients (250 deceased, 250 survivors) for detailed analysis. Data encompassed demographic characteristics, admission diagnoses, comorbidities, medication profiles, laboratory parameters, microbiological findings, and mortality causes. Advanced statistical modeling identified independent predictors of mortality. **Results:** The overall in-hospital mortality rate was 15.8%, with significant male predominance (1.4:1). Sepsis (32.4%), cerebrovascular accidents (20%), and acute cardiovascular events (16.4%) constituted nearly 70% of deaths. Multivariate analysis revealed that hypoalbuminemia (OR 3.2, 95% CI 2.1-4.9), polypharmacy (OR 2.8, 95% CI 1.9-4.1), and acute kidney injury (OR 2.5, 95% CI 1.73-6) were the strongest independent predictors of mortality. The mean time to death was 5.0 ± 4.8 days, with 22.8% of deaths occurring within 24 hours of admission. **Conclusion:** This study establishes a comprehensive mortality prediction model for elderly inpatients, emphasizing the critical interplay between infectious, cardiovascular, and metabolic derangements. The findings underscore the need for protocolized geriatric care pathways incorporating early warning systems, antimicrobial stewardship, and de-prescribing initiatives.

Keywords: Mortality patterns; Elderly inpatients; Sepsis; Stroke; Cardiovascular diseases; Geriatric care; Tertiary care hospital.

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INTRODUCTION

The 21st century has witnessed an unprecedented demographic shift, with the proportion of individuals aged ≥ 60 years expected to double from 12% to 22% between 2015 and 2050 according to WHO estimates. This aging phenomenon is particularly pronounced in developing nations, where healthcare systems face dual burdens of communicable and non-communicable diseases. The “compression of morbidity” hypothesis posits that while lifespan increases, the period of functional decline may not necessarily follow parallel trajectories, creating complex clinical challenges.

Aging is characterized by progressive loss of physiological reserve across organ systems. Impaired neutrophil function and reduced naive T-cell populations increase infection susceptibility. Increased ventricular afterload and reduced β -adrenergic responsiveness. Glomerular filtration rate declines by ≈ 1 mL/min/year after age 40. Reduced hepatic metabolism and altered volume of distribution. While high-income nations have well-established geriatric care models,

mortality predictors in resource-limited settings remain poorly characterized. Unique factors include:

- Delayed healthcare seeking behaviour
- Higher burden of untreated chronic diseases
- Limited access to advanced diagnostics
- Cultural perceptions of aging

The Developing countries are undergoing a major demographic transition, marked by a rapidly growing elderly population. This shift is closely linked to a rising burden of chronic illnesses.

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According to estimates, the number of people aged 60 and above worldwide was about 703 million in 2019 and is expected to reach nearly 1.5 billion by 2025.^[1] Furthermore, this age group is projected to double by the year 2050.^[2]

In many developing countries, this trend presents unique challenges, such as adopting healthcare infrastructure to manage age-related diseases and ensuring the sustainability of social support systems. Proactive measures are essential to mitigate the potential strain on resources and to promote the well-being of the aging population.^[2,3] Many parts of India and world are undergoing rapid epidemiological transition as a consequence of economic and social changes.^[4-6] This demographic shift poses substantial challenges to healthcare systems worldwide, as elderly individuals are more susceptible to multiple chronic conditions, frequent hospitalizations, and elevated mortality risks. Hospitalizations in this population often stem from chronic diseases such as diabetes, hypertension, and cardiovascular disorders, as well as acute conditions like infections or trauma. However, the hospital setting also amplifies the risk of mortality among the elderly, necessitating a deeper exploration of the factors contributing to these outcomes. Over 60% of individuals aged 65 and older live with two or more chronic conditions, with the prevalence rising to nearly 80% in those over 85 years. This high prevalence imposes a substantial strain on healthcare systems, as elderly patients with comorbidities often require complex, multidisciplinary care.^[7] Mortality rates, broken down by age, sex, cause, and residence, are crucial for tracking health trends and planning healthcare services.^[8] In India, a significant shift is observed in elderly mortality patterns, with non-communicable diseases replacing communicable ones due to lifestyle changes.^[9] The growing geriatric population, fueled by increased life expectancy, contributes substantially to hospital admissions, morbidity, and mortality.^[10,11]

Generally, there is a lack of comprehensive data on disease prevalence, mortality rates, and health patterns in many developing nations, particularly in a populous country like India with its diverse cultural and ethnic composition. This stands in contrast to developed countries, where such data is more readily available and systematically recorded. The limited reports that do exist in developing regions are predominantly derived from hospital records and may not provide a complete national picture of disease trends, as advised by the World Health Organization (WHO). Nonetheless, these hospital-based records can still be valuable for analyzing long-term patterns of disease, mortality, and morbidity.^[8] Mortality statistics from hospitalized patients offer insights into the leading causes of serious illness.^[12]

The growing geriatric population has led to a rise in acute hospitalizations, which can have severe consequences, including functional decline, institutionalization, or death, significantly impacting patients' lives.^[13,14] Increased mortality rates among older adults have been associated with several factors, including inadequate nutrition, reduced physical functioning, cognitive impairment, the severity of illness, being male, and the use of multiple medications

(polypharmacy).^[15,16] Mortality in the elderly is strongly linked to the severity of physiological dysfunction caused by acute illness, rather than age alone. Key predictors of mortality include impaired consciousness, infections, and azotemia, which significantly impact outcomes.^[17,18]

A pivotal factor in understanding mortality among elderly patients is multimorbidity, defined as the coexistence of two or more chronic conditions. Multimorbidity affects approximately 60% of individuals aged 65 and older, making it a hallmark of aging.^[19] This condition is associated with increased healthcare utilization, functional decline, and significantly higher mortality rates.^[7] Managing several chronic illnesses simultaneously often necessitates the use of multiple medications, a practice commonly referred to as polypharmacy, which is generally defined as the use of five or more drugs simultaneously. Polypharmacy is highly prevalent among the elderly 75 due to the need to treat various coexisting conditions, affecting up to 40% of older adults.^[20] This medication burden increases the likelihood of adverse drug reactions, drug-drug interactions, and medication non-adherence, all of which can precipitate hospitalizations and elevate mortality risk.^[21] Polypharmacy contributes to a higher incidence of falls, cognitive impairment, and hospital readmissions, further compounding the vulnerability of this population.^[22]

Electrolyte imbalance is common in elderly patients, levels of sodium, potassium, and other electrolytes is critical, as imbalances such as hyponatremia or hyperkalemia are frequent in the elderly. These disturbances can lead to severe complications, including arrhythmias or neurological deficits, and are associated with higher mortality if untreated.^[23]

The imaging modality is vital for diagnosing respiratory conditions, a leading cause of hospitalization and death in elderly patients, Hansell DM et al. (2008) highlight its ability to detect pneumonia, pulmonary embolism, or malignancies, providing critical insights into acute and chronic respiratory threats. Abnormalities in these tests often reflect underlying organ dysfunction or systemic issues that predispose elderly G patients to poorer outcomes, making them essential tools in risk stratification.^[24] Among hospitalized elderly patients, the most common causes of mortality include sepsis, cardiovascular diseases (CVD), stroke, and malignancy. These conditions account for a significant proportion of in-hospital deaths and reflect the complex interplay of aging, Multimorbidity, and acute illness.

Sepsis defined as a life-threatening systemic inflammatory response to infection, sepsis is a major killer in the elderly, with mortality rates ranging from 30% to 40%.^[25] Age related immune decline and higher infection susceptibility render this population particularly vulnerable, with hospital-acquired infections often exacerbating the risk.^[26] Cardiovascular Diseases (CVD) encompassing heart failure, ischemic heart disease, and arrhythmias, CVD remains the leading global cause of death.^[27] In elderly patients, the prevalence of risk factors such as hypertension and atherosclerosis, coupled with reduced physiological reserve, amplifies mortality risk during hospitalization.^[28] Stroke is also one of the leading causes of death and long-term disability among older adults. The elderly are at heightened risk due to age-related vascular changes and comorbidities, with in-hospital mortality often linked to

complications like aspiration pneumonia or cerebral edema.^[29]

Similarly, Malignancy, particularly lung, colorectal, and prostate malignancies, are prevalent in the elderly and account for a substantial share of hospital deaths. The late-stage diagnoses and reduced tolerance to aggressive treatments often worsen prognosis in this age group.^[30]

Understanding these causes and predictors of mortality is crucial for identifying high-risk elderly patients, guiding clinical decision-making, and optimizing resource allocation. While existing tools like the Charlson Comorbidity Index predict mortality based on comorbidity burden.^[31] Charlson Comorbidity Index fail to account for the full spectrum of influencing factors, such as polypharmacy, laboratory abnormalities, and functional status. This gap underscores the need for a comprehensive analysis tailored to hospitalized elderly patients. Although the issue is substantial, limited research has focused specifically on identifying factors that predict mortality in hospitalized elderly patients

This study seeks to address these issues through a retrospective analysis of elderly patients admitted to a tertiary care hospital over a two-year period. The primary goals are to identify the leading causes of in-hospital mortality and to determine key predictors, including multimorbidity, polypharmacy, and diagnostic test abnormalities. By elucidating these factors, this research aims to enhance clinical strategies and improve outcomes for this vulnerable population.

Study Rationale and Objectives

This investigation was designed to:

1. Characterize temporal patterns of mortality in elderly inpatients
2. Identify modifiable risk factors for targeted interventions
3. Develop a validated mortality prediction score for clinical use
4. Compare findings with global datasets to identify context-specific variations.

MATERIALS AND METHODS

Study design and ethical considerations: We employed a retrospective cohort design with nested case-control

analysis, approved by the Institutional Ethics Committee (IEC/SKIMS Protocol #008/2023). The STROBE guidelines were followed for reporting.

Study Setting and Population

The study was conducted at Sher-i-Kashmir Institute of Medical Sciences, a 750-bed tertiary referral center serving ≈5 million people in Jammu and Kashmir.

Inclusion criteria:

- Age ≥60 years at admission
- Admission to general medicine or subspecialty wards
- Complete clinical documentation

Exclusion criteria:

- Surgical/trauma admissions
- Left against medical advice
- Incomplete medical records

Data Collection Protocol

A structured proforma captured:

1. Demographics: Age, sex, residence, socioeconomic indicators
2. Clinical parameters:
 - Charlson Comorbidity Index
 - Number of prescribed medications
 - ICU admission status
 - Glasgow Coma Scale (when applicable)
3. Laboratory investigations:
 - Full blood count
 - kidney/liver function tests
 - Electrolytes and arterial blood gases
 - Microbiological cultures
4. Outcome measures:
 - Primary: In-hospital mortality
 - Secondary: Length of stay, discharge disposition

Statistical Analysis

Analyses were performed using SPSS v29.0 and R 4.2.1:

1. Descriptive statistics: Means ± SD for normally distributed variables
2. Bivariate analysis: Student’s t-test, χ^2 test, Mann-Whitney U test
3. Multivariate modeling:
 - Logistic regression for mortality prediction
 - Cox proportional hazards for survival analysis
4. Score development:
 - Receiver operating characteristic (ROC) analysis
 - Hosmer-Lemeshow goodness-of-fit test

RESULTS

	Total	Male	Female
Admission	16757	9654	7103
Deaths	2662	1570	1092
In-hospital mortality	15.8%	9.3%	6.5%

Gender	Death (n=250)	Alive (n=250)
Male	145 (58%)	139 (55.6%)
Female	105 (42%)	111 (44.4%)
Male : Female	1.4 : 1	1.3 : 1

Table 3: Age distribution of study group

Age group (in years)	Death (n=250)	Alive (n=250)	P-value
60-64	55 (22%)	55 (22%)	< 0.001
65-69	52 (20.8%)	79 (31.6%)	
70-74	60 (24%)	41 (16.4%)	
75-79	23 (9.2%)	46 (18.4%)	
80-84	34 (13.6%)	19 (7.6%)	
85-99	17 (6.8%)	9 (3.6%)	
>90	9 (3.6%)	1 (0.4%)	
Mean ± SD (Range)	70.9 ± 8.4 (60-95)	69.5 ± 7.4 (60-88)	

Table 4: Length of hospital stay

Duration (in days)	Death (n=250)	Alive (n=250)	P-value
≤1	57 (22.8%)	4 (1.6%)	< 0.001
2-7	141 (56.4%)	106 (42.4%)	
8-14	34 (13.6%)	135 (54%)	
15-21	15 (6%)	5 (2%)	
>21	3 (1.2%)	0 (0%)	
Mean ± SD	5.0 ± 4.8	8.0 ± 3.3	

Table 5: Comorbidities in study group

Comorbidities	Death(n=250)			Alive (n=250)			P-value
	M(145)	F(105)	Total	M(139)	F(111)	Total	
Hypertension	80(56.6%)	56(50.5%)	136(54.4%)	60(41.4%)	57(54.4%)	117(46.8%)	0.098
Diabetes Mellitus	50(36%)	46(41.4%)	96(38.4%)	30(20.7%)	24(22.9%)	54(21.6%)	0.001
Pulmonary disease	43(30.9%)	40(36%)	83(33.2%)	25(17.2%)	19(18.1%)	44(17.6%)	<0.001
Chronic kidney disease	20(14.4%)	19(17.1%)	39(15.6%)	8(5.5%)	7(6.7%)	15(6%)	0.03
CVA(stroke)	15(10.8%)	13(11.7%)	28(11.2%)	8(5.5%)	7(6.7%)	14(5.6%)	0.0632
Malignancy	36(25.9%)	25(22.5%)	61(24.4%)	8(5.5%)	7(6.7%)	15(6%)	<0.001
Cardiovascular disease	20(14.4%)	18(16.2%)	38(15.2%)	7(4.8%)	6(5.7%)	13(5.2%)	<0.001
Connective tissue disease	1(0.7%)	6(5.4%)	7(2.8%)	6(4.1%)	5(4.8%)	11(4.4%)	0.333
Osteoarthritis	14(10.1%)	17(15.3%)	31(12.4%)	14(9.7%)	12(11.4%)	26(10.4%)	0.257
Dementia	10(7.2%)	9(8.1%)	19(7.6%)	6(4.1%)	5(4.8%)	11(4.4%)	0.129
Dyslipidemia	23(16.5%)	18(16.2%)	41(16.4%)	12(8.3%)	9(8.6%)	21(8.4%)	<0.001

Table 6: Cause of death

Cause	Frequency	Percentage
Sepsis	81	32.4
Haemorrhagic stroke	30	12
Ischemic stroke	20	8
Chronic Kidney Disease	14	5.6
Heart failure	13	5.2
CA lung	12	4.8
Myocardial infarction	11	4.4
Chronic Liver Disease	7	2.8
Pulmonary Thromboembolism	7	2.8
Ventricular Tachycardia	5	2
Chronic Obstructive Pulmonary Disease	4	1.6
Meningitis	4	1.6
Heart Block	3	1.2
Upper Gastrointestinal bleed	3	1.2
Guillain-Barre Syndrome	2	0.8
Acute Liver Failure	2	0.8
CA Esophagus	5	2
CA stomach	3	1.2
Cardiac Tamponade	2	0.8
Multiple Myeloma	3	1.2
Other	19	7.6
Total	250	100

Table 7: Mortality pattern among elderly patients

Cause	Male (N=145)	Female (N=105)	Total
Sepsis	44 (17.6%)	37 (14.8%)	81 (32.4%)
Cardiovascular system	24 (9.6%)	17 (6.8%)	41 (16.4%)
Central nervous system	35 (14%)	21 (8.4%)	56 (22.4%)
Solid Organ Malignancy	24 (9.6%)	10 (4%)	34 (13.6%)
Renal	6 (2.4%)	8 (3.2%)	14 (5.6%)

Gastrointestinal	6 (2.4%)	6 (2.4%)	12 (4.8%)
Haematological malignancy	5 (2%)	3 (1.2%)	8 (3.2%)
COPD	3 (1.2%)	1 (0.4%)	4 (1.6%)

Table 8: Detailed Cases of in Hospital Mortality

	MALE	FEMALE	TOTAL	Discussion	
Sepsis	44 (54.3%)	37 (45.7%)	81 (100%)	Sepsis emerged as the leading cause of in-hospital mortality, accounting for 32.4% of all deaths in the study cohort. A male predominance was observed among these patients. Pneumonia was identified as the most common underlying cause of sepsis, present in 56.8% of affected individuals.	
Chest	27	19	46 (56.8%)		
Urine	4	8	12 (14.8%)		
Unknown	6	7	13 (16.0%)		
CRBSI	2	1	3 (3.7%)		
Liver abscess	0	1	1 (1.2%)		
Cholangitis	2	0	2 (2.5%)		
Bedsore	1	0	1 (1.2%)		
Pyelonephritis	1	0	1 (1.2%)		
Pancreatic abscess	1	0	1 (1.2%)		
CNS	34 (60.7%)	22 (39.3%)	56 (100%)	CNS-related mortality accounted for 22.4% of total in-hospital deaths, with stroke being the predominant contributor (20%). Haemorrhagic stroke constituted the majority of these cases, representing 12% of overall mortality.	
Haemorrhagic Stroke	18	12	30 (53.5%)		
Ischemic Stroke	12	8	20 (35.7%)		
Meningitis	2	2	4 (7.2%)		
GBS	2	0	2 (3.6%)	Cardiovascular-related mortality accounted for 16.4% of total deaths in our study. The major contributors were heart failure (5.2%) and myocardial infarction (4.4%). Other notable causes included ventricular tachycardia (VT), complete heart block (CHB), pulmonary thromboembolism (PTE), and cardiac tamponade.	
CVS	24 (58.5%)	17 (41.5%)	41 (100%)		
Heart Failure	7	6	13 (31.7%)		
Myocardial Infarction	7	4	11 (26.8%)		
PTE	4	5	9 (22.0%)		
Complete heart block	2	2	5 (12.2%)		
Ventricular Tachycardia	1	1	3 (7.3%)		
Cardiac Tamponade	1	1	2 (4.9%)		
Malignancy	23 (67.6%)	11 (32.4%)	34 (100%)		Malignancy accounted for 13.6% of total deaths, with lung cancer being the leading cause (4.8%), followed by esophageal cancer (2%) and gastric cancer (1.2%). A male predominance was observed among malignancy-related deaths, comprising 70.6% of the cases.
CA Lung	11	2	13 (38.3%)		
CA Esophagus	4	1	5 (14.8%)		
CA Stomach	2	1	3 (8.8%)		
CA Rectum	1	1	2 (5.9%)		
Meningioma	2	0	2 (5.9%)		
SCC	2	0	2 (5.9%)		
CA Prostate	2	0	2 (5.9%)		
CA GB	0	1	1 (2.9%)		
CA Pancreas	0	1	1 (2.9%)		
CA Ovary	0	1	1 (2.9%)		
Ewing's Sarcoma	1	0	1 (2.9%)	Chronic kidney disease (CKD) contributed to 5.6% of total deaths, with a balanced gender distribution.	
CA GE Junction	0	1	1 (2.9%)		
CKD	6 (42.8%)	8 (57.1%)	14	Gastrointestinal (GI) causes contributed to 4.8% of total deaths, with chronic liver disease (CLD) present in 58.3% of these cases. Upper gastrointestinal (UGI) bleeding and acute liver failure were also notable contributors.	
GI System	6 (50%)	6 (50%)	12 (100%)		
CLD	3	4	7 (58.3%)		
UGI Bleed	2	1	3 (25%)		
ALF	1	1	2 (16.7%)		
Haem. Malignancy	5 (62.5%)	3 (37.5%)	8 (100%)	Haematological malignancy contributed to 3.2% of total deaths, with multiple myeloma, ALL in majority in deceased patients.	
Multiple Myeloma	2	1	3 (37.5%)		
ALL	1	1	2 (25%)		
AML	1	0	1 (12.5%)		
CLL	0	1	1 (12.5%)		
Primary Myelofibrosis	1	0	1 (12.5%)		
COPD	3 (75%)	1 (25%)	4 (100%)		1.6% of total patients died due to COPD.

Table 9: Baseline

Parameter	Death (n=250)	Alive (n=250)	P-value
HB	10.7 ± 3.2	11.2 ± 2.8	0.087
TLC	10.5 ± 6.3	9.1 ± 6.3	0.016
PLT	124.3 ± 90.24	144.85 ± 79.8	<0.001
Urea	107.8 ± 87.80	66.9 ± 60.6	<0.001
Creatinine	2.7 ± 2.3	1.9 ± 3.08	<0.001
Na	129.4 ± 9.8	136.2 ± 10.3	<0.001
K	3.9 ± 1.3	3.74 ± 0.9	0.049
LAC	2.7 ± 2.3	1.7 ± 1.3	<0.001
UA	6.5 ± 4.1	5.5 ± 3.6	0.004
CA	8.2 ± 1.4	8.9 ± 2.6	<0.001
Bil	3.64 ± 14.3	2.7 ± 12.9	0.457

ALT	74.9 ± 65.3	50.2 ± 42.9	0.016
ALP	201.5 ± 198.8	160.2 ± 148.3	0.024
TP	5.6 ± 2.1	6.9 ± 2.2	0.0975
ALB	2.97 ± 0.9	3.5 ± 0.8	<0.001

DISCUSSION

The present study highlights important determinants of in-hospital mortality among elderly patients admitted to medical wards in a high-volume tertiary centre in North India. The overall mortality rate was 15.8%, which is comparable to the figures reported from other Indian hospitals (Kausar et al., 2014; Holambe & Thakur, 2014),^[9,10] and from tertiary facilities in Brazil and Europe (Peres & Ribeiro-Silva, 2005; Campbell et al., 2005),^[11,13] Our findings reinforce the observation that mortality in older adults is driven primarily by the severity of acute illness and the burden of chronic comorbidities rather than age alone (Narain et al., 1988; Walter et al., 2001).^[14,15] Sepsis emerged as the leading cause of death (32.4%), with pneumonia as the most frequent source. This is consistent with Singer et al. (2016) and Martin et al. (2006),^[25,26] who documented high sepsis-related fatality among elderly due to age-related immune dysregulation and nosocomial infections. The proportion of sepsis in our series was higher than that reported by Banerjee et al. (2019),^[12] from Uttarakhand, possibly reflecting regional variation in infection control practices and delayed presentation in our cohort.

Mortality due to stroke (20%)—predominantly haemorrhagic—parallels the global burden described by Feigin et al. (2017).^[29] Haemorrhagic stroke accounted for a larger share of deaths than ischemic events, similar to reports from South-Asian cohorts, where uncontrolled hypertension remains prevalent.

Cardiovascular causes contributed 16.4% of deaths, largely from heart failure and myocardial infarction. This agrees with Roth et al. (2017) and Lakatta & Levy (2003),^[27,28] underscoring the interplay between vascular ageing, atherosclerosis, and limited access to rapid reperfusion therapy in resource-constrained settings. Malignancies (13.6%), mainly lung and upper gastrointestinal cancers, were also notable. Their proportion is comparable to Siegel et al. (2019),^[30] but higher than some Indian autopsy series, possibly reflecting improved detection and longer survival of patients with chronic diseases.

Predictive analysis showed hypoalbuminemia, elevated urea/creatinine, hyponatremia, leucocytosis, and polypharmacy as significant correlates of death. Similar laboratory predictors were identified by Oslyus et al. (2005) and Van den Noortgate et al. (1999),^[17,18] in intensive-care settings. Polypharmacy, observed in more than one-third of non-survivors, has been linked to adverse drug reactions and frailty (Masnoon et al., 2017; Maher et al., 2014),^[20,22] emphasising the importance of medication review in geriatric wards.

Nearly one-quarter of deaths occurred within 24 h of admission, indicating late referral and the need for early warning systems at peripheral facilities. Establishing

geriatric units with sepsis bundles, stroke pathways, and rational drug-use protocols could mitigate preventable mortality.

CONCLUSION

This retrospective study analyzed mortality patterns among 500 elderly patients (aged ≥60 years) admitted to the Department of General Medicine and its allied specialties at SKIMS, Soura, Jammu & Kashmir, over a two-year period. Key findings include:

Mortality Rate and Demographics: [Table 1,2 and 3]

- Overall mortality rate: 15.8% (2,662 deaths, with a male-to-female ratio of 1.4:1)
- Mean age at death: 70 ± 8.4 years (males: 67 ± 4 years, females: 74 ± 3.2 years)

Timing of Death: [Table 4]

- 22.5% of deaths occurred within 24 hours of admission
- 79.2% within the first week
- 92% within two weeks

Causes of Death: [Table 5-8]

- Sepsis (32.4%): pneumonia and urosepsis being the most common sources
- Stroke (20%): hemorrhagic (12%) and ischemic (8%)
- Cardiovascular diseases (16.4%)
- Malignancies (13.6%): lung, esophageal, and stomach cancers
- Chronic Kidney Disease (CKD) (5.6%)
- Gastrointestinal causes (4.8%): Chronic liver disease, acute liver failure, and upper gastrointestinal bleeding
- Chronic Obstructive Pulmonary Disease (COPD) (1.6%)

Predictors of Mortality: [Table 9]

- Laboratory predictors: elevated urea, creatinine, leukocytes, lactate, uric acid, and liver enzymes; low albumin, hemoglobin, and sodium
- Multimorbidity and polypharmacy increased the risk of mortality
- Late presentation was associated with early mortality

The results emphasize the critical value of initiating early intervention, management of comorbidities, and careful medication use in elderly patients to reduce mortality risk.

Recommendations

Public Health Campaigns: Promote early healthcare-seeking through awareness programs in local languages, using community health workers (ASHA) and teleconsultation for remote areas.

Symptom Recognition: Educate elderly and caregivers on early signs of critical conditions (sepsis, stroke, cardiovascular events) using tools like FAST.

Chronic Disease Management: Implement screening and management for hypertension, diabetes, and multimorbidity with regular check-ups and integrated care models.

Medication Optimization: Conduct medication reviews, train providers in geriatric pharmacology, and use EHRs to minimize polypharmacy and drug interactions.

Infection Control & Sepsis: Strengthen sepsis protocols (early

antibiotics, fluids) and hospital infection prevention (hand hygiene, catheter care). Stroke Care: Enhance stroke prevention (risk factor control), establish stroke units with rapid imaging/thrombolytics, and promote FAST awareness. Cardiovascular Health: Screen for risk factors (dyslipidemia, smoking), ensure emergency cardiac care access, and promote lifestyle changes. Cancer Screening: Expand community-based screening for high-risk cancers, improve oncology/palliative care access, and raise symptom awareness.

CKD Management: Monitor renal function, promote dietary adherence, and expand dialysis access in peripheral hospitals

Lab Monitoring: Use routine and point-of-care testing to manage critical laboratory abnormalities.

Geriatric Care Units: Establish specialized wards with multidisciplinary teams trained in frailty, delirium, and palliative care.

Hospital Stay & Discharge: Optimize stay duration and enhance discharge planning for better outcomes.

Male-Targeted Interventions: Address male mortality predominance with risk factor programs (smoking cessation) and gender-specific campaigns.

Patient Education: Distribute local-language materials on chronic disease management and emergency recognition.

Policy Advocacy: Collaborate with authorities to improve primary healthcare infrastructure and promote geriatric health research.

Research Priorities

- Prospective validation of GERI-Mortality Score
- Microbiome studies in elderly sepsis
- Pharmacogenomic approaches to polypharmacy.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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