

## To evaluate mortality rate among patients of aspiration pneumonia in a tertiary care centre: a retrospective study

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### ABSTRACT

**Introduction-** Compared to non-aspiration pneumonia, aspiration pneumonia has higher mortality and recurrence rates. Examining independent patient characteristics that are linked to mortality in patients needing acute admission for aspiration pneumonia at a tertiary centre was the main goal. Reviewing the potential effects of variables, including mechanical ventilation and speech-language pathology intervention, on patient mortality and length of stay (LOS) was one of the secondary objectives.

**Material & methods-** The study included patients who were older than 18 and were admitted with aspiration pneumonia as their primary diagnosis at a tertiary care center. The patient characteristics were subjected to descriptive analysis using age as a continuous variable. In order to determine the independent factors that contributed to in-hospital mortality, multivariable logistic regression was employed. Cox proportional-hazard regression was performed to determine the independent factors that affected LOS.

**Results-** This study covered 100 patients in total. Patients' average ages were  $79.3 \pm 13.5$ , and 22% of them died while they were hospitalized. LOS was longer in patients who passed away, with a median length of 11.5 days ( $p = 0.013$ ). Female gender was revealed to be a protective factor (0.03), but age and invasive mechanical ventilation were independent predictors of mortality ( $p < 0.05$ ). When compared to younger patients, elderly patients had a higher risk of passing away while they were in the hospital.

**Conclusion -** Elderly people have a higher mortality risk when hospitalized for aspiration pneumonia than other patient populations. This calls for better community-wide prevention measures.

**Keywords-** Aspiration, Hospital Stay, Mortality, Pneumonia, Risk

### INTRODUCTION

A prevalent clinical syndrome with well-established epidemiology and microbiology is pneumonia. Despite being a common syndrome of pneumonia in the elderly, aspiration pneumonia (AP) is less well-known and affects 5–15% of patients with pneumonia [1]. Lack of a sensitive and specific aspiration marker, overlap with other pneumonia types, and doctors' lack of distinction between aspiration pneumonia are all obstacles to understanding aspiration pneumonia.[2,3] AP, which occurs when gastric contents are inhaled and induce inflammation without causing a subsequent bacterial infection, differs from aspiration pneumonia in that the latter develops following the aspiration of oropharyngeal contents.[4]

Positioning patients to stop further aspiration and routine suctioning of oropharyngeal secretions are common in the treatment of these individuals. The choice of antibiotic is often guided by bronchoalveolar lavage. Antibiotics are frequently started. Additionally, patients are given oxygen while having their oxygen saturation closely monitored. If a patient exhibits symptoms of hypoxia, intubation and artificial ventilation may be necessary, necessitating ICU hospitalization [5]. Leroy et al. found that 23% of patients admitted to the ICU for severe community-acquired pneumonia had aspiration pneumonia as the primary cause, despite the fact that accurate data on the incidence of aspiration pneumonia necessitating ICU admission is not yet available [6]. Complications include acute respiratory distress syndrome, empyema, abscess, and respiratory failure can happen even under ICU-level care. Along with high mortality rates, recovery can also be a drawn-out process requiring multiple admissions.[7]

There is very scarce data available on patients with aspiration pneumonia therefore the current study is done to examine independent patient factors that are associated with mortality in those requiring acute admission for aspiration pneumonia and investigation of the potential effects of medical interventions on patient mortality, length of stay (LOS), and mechanical ventilation.

## MATERIAL & METHODS

The retrospective study was conducted among 100 patients admitted to tertiary care hospital during the period of study with the diagnosis of aspiration pneumonia. The ethical permission was taken from the institutional ethical committee of allied medical college and hospital. Inclusion criteria included patients older than 18 years and willing to participate in the study. Patients younger than the age of 18, those with secondary diagnosis of aspiration pneumonia (those who were already hospitalized, and subsequently developed pneumonia as a secondary complication) were excluded from this study.

Age, gender, admission and discharge dates, and the number of medical comorbidities (divided into 0, 1, and 2) were recorded as baseline patient variables. Patients' comorbidities were calculated using the Charlson Comorbidity Index (CCI) to forecast in-hospital mortality [8,9]. The study's primary goal was in-hospital mortality, with secondary outcomes included patients' length of stay (LOS), requirement for invasive mechanical ventilation and hospitalization expenditures.

Statistical analysis was done using SPSS version 23.0. Descriptive analysis compared groups of interest using parametric or non-parametric t-tests for continuous variables as appropriate and Chi-Square tests for categorical variables. Multivariable logistic regression model for the mortality outcome and partial residuals were used to assess the functional form of the continuous variables. A two-sided p-value of <0.05 was used as the criterion for statistical significance.

## RESULTS

Out of 100 patients 22 % had in-hospital mortality and they were older in age as compared to the group that survived (age  $79.3 \pm 13.5$  vs.  $67.2 \pm 18.3$  respectively,  $p < 0.001$ ). Patients who died had longer LOS with a median length of 11.5 days ( $p = 0.013$ ). There were no significant gender differences between the two groups ( $p = 0.21$ ), patients who died during hospitalization had higher CCI scores ( $p = 0.01$ ) and were more likely to be mechanically ventilated ( $p = 0.006$ ) and this was comparable between the two groups as shown in Table 1.

Table 1 shows in hospital mortality of patients with aspiration pneumonia

Baseline characteristics	In hospital mortality		P value
	No	Yes	
Age , mean (SD)	$67.2 \pm 18.3$	$79.3 \pm 13.5$	<0.001
Gender, male (%)	48 (62)	14 (63)	0.21
Number of comorbidities, n (%)			0.042
0	1 (1.2)	0 (0)	
1	11 (14)	2 (6.2)	
$\geq 2$	66 (84.8)	20 (93.8)	

CCI, median (IOR)	1.0 (0,2)	2 (1,3)	0.01
Invasive mechanical ventilation, n (%)	10 (13.4)	5 (23.5)	0.006
Total LOS, median (IOR)	6 (3,12)	11.5 (3.1,18.5)	0.013

Multivariable logistic regression was done using age as a continuous variable. Mechanical ventilation was found to be an independent variable with p less than 0.05 whereas female gender was found to be protective against in hospital mortality (p=0.03) as shown in table 2.

Table 2 shows multivariable logistic regression for in hospital mortality

Variable	OR	Confidence interval (%)	P value
Age	1.70	1.43-2.01	<0.001
Gender (F:M)	0.61	0.37-0.91	0.03
Invasive mechanical ventilation (Yes: No)	2.54	1.53-4.29	<0.05

A Cox proportional-hazard model was used to control for variables including CCI, age ( $\geq 65$  vs.  $< 65$ ), gender and invasive mechanical ventilation. Elderly patients were identified to have higher risk of dying during their hospital course when compared to younger patients, average length of stay for patients was within 110 days as shown in table 3.

Table 3 shows length of hospital stay and mortality as a competing risk

Variable	HR	Confidence interval (%)	P value
Age	5.21	2.97-8.13	<0.001
Gender (F:M)	0.54	0.58-1.21	0.43
Invasive mechanical ventilation (Yes: No)	0.60	0.40-0.93	0.04
CCI	0.95	0.87-1.05	0.46

## DISCUSSION

The present study was conducted in a tertiary care centre among 100 patients of aspiration pneumonia to examine independent patient factors that are associated with mortality in those requiring acute admission for aspiration pneumonia. It was found out that in patients admitted with aspiration pneumonia as their primary diagnosis, older age and needing mechanical ventilation during hospitalization were independent risk factors for in-hospital mortality. Due to the older patient population's greater mortality rate, LOS was comparable between the two age groups.

Most patients treated for aspiration pneumonia were 65 or older, with an average age of  $80.7 \pm 6.5$ . The deceased patients were 79.3 13.5 years old on average. The prevalence of aspiration pneumonia is higher among the elderly, according to the available information [10]. The swallowing function can be significantly impacted by cerebral atrophy, diminished nerve function, and muscle atrophy as the human body ages naturally [12]. Oropharyngeal dysphagia significantly increased the risk of pneumonia (OR 11.9), according to case-control research by Almirall et al., and 92% of patients who were diagnosed with pneumonia reported oropharyngeal dysphagia symptoms on a video fluoroscopic swallowing study (VFSS) [12]. Compared to healthy young adults, there are radiological and video fluoroscopic changes in the oral and pharyngeal phases of swallowing in even otherwise healthy elders [13]. Additionally, elders are more likely to develop aspiration pneumonia due to their propensity for multiple comorbidities [11]. Aspiration can result from medical comorbidities that adversely influence several mechanical components of oropharyngeal swallowings, such as lung disorders, stroke, dementia, or Parkinson's disease [14,15]. This pattern was shown in our patient cohort, where patients 65 and older had a larger percentage of people with two or more comorbidities and higher CCI scores than the younger group (p <0.001).

The current investigation showed an alarming in-hospital mortality rate among older patients who were admitted with aspiration pneumonia as their major diagnosis. In 2020, 6.8 million people in Canada (18% of the total population) were 65 or older [16]. Aspiration pneumonia admission to the hospital can be reduced with the aid of community programs including dysphagia screening. This can not only help prevent admission, but also decrease hospital costs, and ultimately death.

There were many limitations to our study. Only people with an aspiration pneumonia main diagnosis not a subsequent diagnosis could meet the inclusion criteria. The term describes the primary diagnosis for a patient's admission to the hospital. A secondary diagnosis was made when patients acquired an additional illness on top of their initial diagnosis. The fact that our patient group was confined to a single institute also helped to reduce the range of patient characteristics and treatment choices. Future research will discover additional independent risk factors for aspiration pneumonia treatment outcomes by involving several institutions, patients who received a secondary diagnosis of aspiration pneumonia while receiving hospital care, and more patient and treatment characteristics.

## CONCLUSION

According to this study, elderly individuals have a higher mortality risk when hospitalized for aspiration pneumonia, which calls for the development of better community-based preventative methods.

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