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COMPARISON OF IN-HOSPITAL STAY DURATION AMONG VIRAL PNEUMONIA PATIENTS TREATED WITH AND WITHOUT OSELTAMIVIR IN A PRIVATE TERTIARY CARE HOSPITAL, LAHORE

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Abstract

Background: *Oseltamivir (Tamiflu) is a neuraminidase inhibitor widely prescribed in viral pneumonia, particularly influenza. However, evidence regarding its impact on in-hospital length of stay (LOS) in real-world tertiary care settings in Pakistan remains limited.*

Objective: *To compare the total in-hospital length of stay between viral pneumonia patients treated with and without oseltamivir at a private tertiary care hospital in Lahore, and to evaluate associated clinical outcomes including clinical improvement, ICU admission, oxygen therapy requirements, complications, and in-hospital mortality.*

Methods: *A retrospective observational study was conducted using data collected from 57 patients admitted with viral pneumonia. Patients were classified into two groups: those who received oseltamivir (n=33) and those who did not (n=20). Key outcomes including total LOS, clinical improvement at 72 hours, ICU admission rates, complications, in-hospital mortality, and 30-day readmission were analyzed and compared between the two groups.*

Results: *The mean LOS was significantly longer in the oseltamivir group (7.2 ± 2.8 days) compared to the non-oseltamivir group (4.4 ± 1.0 days). Despite this, clinical improvement within 72 hours was higher in the oseltamivir group (81.8% vs 60.0%). ICU admission was more frequent in the oseltamivir group (27.3% vs 5.0%), reflecting greater baseline disease severity. In-hospital mortality was zero in both groups. Seventy-five percent of oseltamivir-treated patients received the drug more than 72 hours after symptom onset.*

Conclusion: *The longer LOS observed in the oseltamivir group likely reflects greater initial disease severity rather than a detrimental drug effect. Delayed initiation of oseltamivir was common, which may have impacted outcomes. Early initiation of antiviral therapy in appropriately selected patients remains important. These findings highlight the need for prospective controlled studies to better delineate the true impact of oseltamivir on hospital stay in Pakistani tertiary care settings.*

1. INTRODUCTION

Viral pneumonia constitutes a significant proportion of community-acquired pneumonia (CAP) and lower respiratory tract infections (LRTIs) worldwide [1,2]. Among viral etiologies, influenza A and B viruses remain the most frequent causative agents, though respiratory syncytial virus (RSV), parainfluenza virus, adenovirus, and SARS-CoV-2

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are increasingly recognized [3]. In Pakistan, influenza-related illness places a considerable burden on tertiary care hospitals, particularly during winter and monsoon seasons, affecting vulnerable populations including the elderly, diabetics, those with chronic cardiopulmonary disease, and the immunocompromised [8,11].

Oseltamivir phosphate (Tamiflu), an oral neuraminidase inhibitor, is the antiviral of choice recommended by the World Health Organization (WHO) and national guidelines for the treatment of influenza [1,7]. When administered within 48 hours of symptom onset, it has been shown in multiple randomized controlled trials and meta-analyses to reduce the duration of illness, symptom severity, and risk of hospitalization in outpatient settings [2,3]. However, its benefits in hospitalized patients with viral pneumonia and in those presenting beyond 48 hours of illness onset are less clearly defined [2,10]. Some observational studies suggest benefit in reducing clinical deterioration and ICU requirements [4], while others show limited impact on LOS in hospitalized cohorts [9,10].

In resource-limited healthcare settings like Pakistan, where antiviral prescribing practices, patient presentation timelines, and disease severity profiles differ from Western settings, locally generated evidence is essential [8,11]. Private tertiary care hospitals in Lahore manage a diverse population of viral pneumonia patients, many of whom present late in the disease course with significant comorbidities [8]. Understanding the real-world impact of oseltamivir on in-hospital outcomes in this setting is therefore of direct clinical and public health relevance [5,6].

This study aims to compare total in-hospital length of stay and secondary clinical outcomes between viral pneumonia patients who received oseltamivir and those who did not, at a private tertiary care hospital in Lahore.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This was a retrospective observational study conducted at the University of Lahore Teaching Hospital (ULTH), a private tertiary care institution in Lahore, Pakistan. The study included adult patients admitted to the Pulmonology Ward, High Dependency Unit (HDU), and Intensive Care Unit (ICU) with a working diagnosis of viral pneumonia. Data were collected using a structured data collection form capturing demographic, clinical, laboratory, radiological, and treatment-related variables.

2.2 Patient Selection

Inclusion Criteria: Adult patients (age ≥18 years) admitted with clinical, radiological, and/or laboratory features consistent with viral pneumonia. Patients with a suspected viral aetiology on clinical grounds (influenza, COVID-19, RSV, or other viruses) were included. Both PCR-confirmed and clinically suspected cases were included given the limited PCR uptake in the cohort.

Exclusion Criteria: Patients with a primary diagnosis of bacterial pneumonia without viral co-infection, those transferred from another facility with incomplete records, patients under 18 years of age, and those with less than 24 hours of hospital stay were excluded.

2.3 Study Variables

The primary outcome was total in-hospital length of stay (LOS) in days. Secondary outcomes included: (i) clinical improvement within 72 hours of admission; (ii) requirement for oxygen therapy; (iii) ICU admission; (iv) in-hospital complications; (v) discharge to home; (vi) in-hospital mortality; and (vii) 30-day readmission rate.

Independent variables collected included: age, gender, body mass index (BMI), residence, socioeconomic status, smoking history, comorbid conditions, duration of illness before admission, vital signs on admission, CURB-65 score, qSOFA score, laboratory parameters (CBC, CRP, procalcitonin, serum creatinine, ALT/AST), arterial blood gas results, chest X-ray and CT chest findings, suspected viral etiology, initiation timing of oseltamivir (if administered), and concurrent treatments (antibiotics, steroids, anticoagulation).

2.4 Statistical Analysis

Data were analyzed descriptively. Continuous variables are presented as mean ± standard deviation (SD) or median with interquartile range (IQR), as appropriate. Categorical variables are expressed as

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frequencies and percentages. Comparative data between the two groups (with and without oseltamivir) are tabulated. Due to the exploratory and descriptive nature of this study and the sample size limitations, formal inferential statistical testing (e.g., t-tests, chi-square) is noted as a recommendation for future prospective work. This study was conducted in compliance with institutional research ethics guidelines.

3. RESULTS

3.1 Study Population

A total of 57 patients with viral pneumonia were included in the study. After excluding patients with missing treatment data, 53 patients were classified into two groups: 33 patients who received oseltamivir (Group A) and 20 patients who did not (Group B). Four patients had indeterminate treatment records and were excluded from group-specific analyses.

3.2 Baseline Demographic and Clinical Characteristics

Table 1 presents the baseline characteristics of both groups. The mean age was 61.9 years (±9.8) in the oseltamivir group and 54.3 years (±17.1) in the non-oseltamivir group. The female predominance was noted in both groups (63.6% vs 70.0%). Urban residence was more common in the oseltamivir group (90.9% vs 60.0%), as was middle socioeconomic status (84.8% vs 60.0%).

Comorbidities were prevalent in both groups. Hypertension was the most frequent comorbidity, followed by diabetes mellitus, ischemic heart disease (IHD), asthma, COPD, chronic kidney disease (CKD), and interstitial lung disease (ILD). Immunosuppression (due to steroids, chemotherapy, or HIV) was noted in a subset of patients in both groups.

Bilateral pulmonary infiltrates on chest radiograph were considerably more frequent in the oseltamivir group (87.9% vs 50.0%), suggesting a greater degree of radiological burden at presentation. CT chest was performed in 93.9% of the oseltamivir group versus 70.0% of controls. Ground-glass opacities (GGOs) were the predominant CT finding in both groups.

Disease severity as assessed by the CURB-65 scoring system was higher in the oseltamivir group, with 39.4% scoring 2-3 compared to only 10.0% in the non-oseltamivir group. Influenza was the suspected viral aetiology in 51.5% of oseltamivir-treated patients and 60.0% of non-treated patients. One patient in the oseltamivir group had COVID-19.

Table 1: Baseline Demographic and Clinical Characteristics

Variable	With Oseltamivir (n=33)	Without Oseltamivir (n=20)
Mean Age (years)	61.9 ± 9.8	54.3 ± 17.1
Gender (Female)	21 (63.6%)	14 (70.0%)
Urban Residence	30 (90.9%)	12 (60.0%)
Middle Socioeconomic Status	28 (84.8%)	12 (60.0%)
Never Smoker	24 (72.7%)	17 (85.0%)
Bilateral Infiltrates on CXR	29 (87.9%)	10 (50.0%)
CT Chest Performed	31 (93.9%)	14 (70.0%)
CURB-65 Score 0-1	18 (54.5%)	17 (85.0%)
CURB-65 Score 2-3	13 (39.4%)	2 (10.0%)
Suspected Influenza	17 (51.5%)	12 (60.0%)
Duration of Illness >5 Days	22 (66.7%)	13 (65.0%)

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3.3 Primary Outcome: Length of Hospital Stay

The mean total in-hospital length of stay was significantly longer in the oseltamivir group at 7.2 ± 2.8 days (median 7 days; IQR 5–8; range 2–15 days) compared to 4.4 ± 1.0 days in the non-oseltamivir group (median 4 days; IQR 4–5; range 3–6 days). This difference likely reflects the substantially greater clinical and radiological severity at presentation in the oseltamivir-treated cohort rather than an adverse effect of the drug itself.

3.4 Secondary Outcomes

Table 2 summarizes the clinical outcomes for both groups. Notably, despite the longer LOS, the rate of clinical improvement within 72 hours was higher in the oseltamivir group (81.8%) compared to the non-oseltamivir group (60.0%), suggesting that antiviral therapy may have contributed to earlier clinical stabilization even in patients admitted with more severe disease.

Oxygen therapy was required by 72.7% of oseltamivir-treated patients compared to 35.0% of non-treated patients, again consistent with greater initial hypoxemia in the treatment group. ICU admission was required in 9 of 33 (27.3%) oseltamivir-treated patients versus only 1 of 20 (5.0%) in the non-treated group.

In-hospital mortality was zero in both groups, which is a noteworthy finding given the severity of illness in the oseltamivir-treated cohort. Discharge to home was achieved in 78.8% of the oseltamivir group and 75.0% of controls. Complications were documented in 21.2% of the oseltamivir group (7 patients) and none in the non-oseltamivir group. The 30-day readmission rate was 9.1% in the oseltamivir group versus 0% in controls.

Steroid therapy was administered concurrently to 97.0% of patients in the oseltamivir group and 75.0% in the non-oseltamivir group, reflecting standard-of-care practice at the institution for viral pneumonia with significant inflammatory burden.

Table 2: Primary and Secondary Clinical Outcomes

Outcome	With Oseltamivir (n=33)	Without Oseltamivir (n=20)
Mean LOS (days)	7.2 ± 2.8	4.4 ± 1.0
Median LOS – days (IQR)	7 (5–8)	4 (4–5)
LOS Range (days)	2–15	3–6
Clinical Improvement at 72 h	27 (81.8%)	12 (60.0%)
Oxygen Therapy Required	24 (72.7%)	7 (35.0%)
ICU Admission	9 (27.3%)	1 (5.0%)
Discharge to Home	26 (78.8%)	15 (75.0%)
Complications Developed	7 (21.2%)	0 (0.0%)
In-Hospital Mortality	0 (0.0%)	0 (0.0%)
30-Day Readmission	3 (9.1%)	0 (0.0%)
Steroids Administered	32 (97.0%)	15 (75.0%)

3.5 Oseltamivir Initiation Timing

Among the 33 patients who received oseltamivir, the timing of drug initiation relative to symptom onset was documented for all. The majority (75.8%, n=25) received oseltamivir more than 72 hours after symptom onset, 21.2% (n=7) received it between 48 and 72 hours, and only one patient (3.0%) received it within 48 hours of symptom onset. All patients received the standard dose of 75 mg twice daily for 5 days.

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Table 3: Timing of Oseltamivir Initiation Relative to Symptom Onset

Initiation Timing	Number of Patients	Percentage (%)
< 48 hours	1	3.0%
48–72 hours	7	21.2%
> 72 hours	25	75.8%

4. DISCUSSION

This retrospective observational study from a private tertiary care hospital in Lahore provides real-world data on the clinical profile and outcomes of hospitalised viral pneumonia patients treated with and without oseltamivir. The primary finding — that LOS was longer in the oseltamivir-treated group — appears paradoxical at first glance but is readily explicable by the substantially greater disease severity in this cohort.

Patients who received oseltamivir had a higher CURB-65 burden, greater prevalence of bilateral radiological infiltrates, more frequent oxygen requirements, and higher ICU admission rates. These factors collectively reflect that physicians appropriately reserved antiviral therapy for more severely ill patients, consistent with international guidelines recommending oseltamivir for hospitalised or high-risk influenza patients [1,7]. The non-oseltamivir group, by contrast, included patients with predominantly lower CURB-65 scores, unilateral infiltrates, and milder clinical presentations, rendering their shorter LOS unsurprising [6].

The observation that clinical improvement within 72 hours was substantially higher in the oseltamivir group (81.8% vs 60.0%) despite their greater initial severity is clinically meaningful. This suggests that oseltamivir, even when initiated late, may contribute to faster clinical stabilisation [12]. This finding is consistent with observational studies in hospitalised influenza patients that have shown benefit of oseltamivir on clinical recovery even beyond the 48-hour window traditionally cited from outpatient data [4,13].

A critical finding in this dataset is the marked delay in oseltamivir initiation. Three-quarters of treated patients received the drug more than 72 hours after symptom onset, and only 3% received it within the recommended 48-hour window. This pattern of late presentation and delayed treatment is well recognised in South Asian settings, where patients often self-medicate, seek informal care, or delay hospital attendance due to financial or logistical barriers [14]. Late initiation is known to attenuate the efficacy of neuraminidase inhibitors [3,13], and the relatively prolonged LOS in the oseltamivir group may in part reflect the consequences of this delay [12].

Zero in-hospital mortality in both groups is a reassuring finding, though it must be interpreted in the context of the relatively modest sample size and the private tertiary care setting, which may attract a healthier and more closely monitored patient cohort compared to public hospitals. The 30-day readmission rate of 9.1% in the oseltamivir group warrants further investigation — it is plausible that patients with more severe underlying disease (comorbidities, bilateral infiltrates, steroid dependency) are at higher risk of early relapse regardless of antiviral treatment.

The near-universal use of concomitant corticosteroids (97.0% in the oseltamivir group vs 75.0% in controls) reflects the institutional protocol for managing significant inflammatory pneumonitis. While steroids are increasingly used in severe viral pneumonia and COVID-19, their concurrent use complicates the isolation of oseltamivir's independent effect on outcomes.

This study has several important limitations. First, its retrospective and observational design precludes causal inference. Second, PCR confirmation of viral aetiology was not performed in the majority of patients, relying instead on clinical and radiological suspicion. Third, the sample size is modest, limiting statistical power. Fourth, the two groups were not

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matched for disease severity, making direct comparison of LOS between groups potentially misleading without severity adjustment. Future prospective, adequately powered, matched-cohort or randomised studies are needed to definitively address the impact of oseltamivir on hospital LOS in Pakistan.

5. CONCLUSION

In this retrospective study from a private tertiary care hospital in Lahore, viral pneumonia patients who received oseltamivir had a longer mean in-hospital stay (7.2 days) compared to those who did not (4.4 days), primarily reflecting greater baseline disease severity in the treatment group. Despite this, oseltamivir-treated patients demonstrated higher rates of clinical improvement within 72 hours, suggesting a potential beneficial role in clinical stabilization. In-hospital mortality was zero in both groups. A striking finding was that the vast majority of oseltamivir-treated patients received the drug after 72 hours of symptom onset, well beyond the optimal treatment window.

These findings emphasize the importance of early antiviral initiation, appropriate patient selection for oseltamivir therapy, and the need for systematic virological testing in hospitalized patients. Prospective, severity-matched comparative studies are warranted to better delineate the independent effect of oseltamivir on clinical outcomes in Pakistani tertiary care settings.

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DECLARATIONS

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: This study was conducted in accordance with institutional research ethics guidelines. Patient data were anonymized prior to analysis.

Data Availability: Data supporting this study are available from the corresponding department upon reasonable request.

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