Clinical Outcomes and Economic Burden of Acute Lower Respiratory Tract Infection-Related Hospitalizations among Adults in the United States Post COVID-19 Pandemic

Poster Code: RWD34

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INTRODUCTION

- Acute lower respiratory tract infection (aLRTI) is one of the most common causes of hospitalizations, resulting in substantial deaths each year in the United States (US).
- Common pathogens of aLRTI include influenza virus, RSV, COVID-19, bacteria, and other viruses.
- The economic impact on health systems especially post the COVID-19 pandemic is unknown.

OBJECTIVES

- To assess the clinical outcomes and economic burden of aLRTI-related hospitalizations in the U.S. during 2022-2024, post-COVID-19 pandemic
- To compare the clinical outcomes and economic burden of aLRTI by pathogen type
- To estimate the national total hospitalization cost due to aLRTI during the study period in the U.S.

METHODS

Study design: Retrospective observational study

Data source:

The Premier Healthcare Database (PHD), a large, geographically diverse national database that contains about 25% of all hospital inpatient admissions in the US was used for the study.[2]

PHD

Study Population:

Inclusion criteria:

- Had an inpatient admission to a PHD hospital with a primary diagnosis of aLRTI or with a secondary diagnosis of aLRTI that was present on admission during 2022-2024, AND
- From hospitals with continuous data submission during a 6-month look-back and a 30-day follow-up period.

Exclusion criteria:

- aLRTI occurred during a hospitalization was excluded from analysis

Study time period: January 1, 2022 - December 31, 2024

Pathogen type: was categorized as influenza, COVID-19, RSV, other viral infection, bacterial infection, multiple pathogen infection, other/unknown (e.g., fungal infection) and defined by ICD-10-CM codes

Outcome Variables*

- **Clinical outcomes:** in-hospital mortality, acute kidney injury (AKI), hyperkalemia, invasive mechanical ventilation, sepsis/septic shock
- **Economic outcomes:** total hospitalization cost
- **Healthcare resource utilization:** Total hospital length of stay (LOS), ICU admission, ICU length of stay

Other variables

- **Demographics:** Age, Sex (Men, Women), Race (White, Black, Asian, Other), Primary payor type
- **Season:** Spring (March-May), Summer (June-August), Fall (September-November), Winter (December-February)
- **Charlson comorbidities**

Statistical analysis

- Descriptive statistics were used to report patient characteristics, clinical outcomes and costs (adjusted to 2024US$ based on consumer price index for hospital services).
- Projection weights were used to estimate the national estimates of hospitalizations and costs by type of pathogen.

RESULTS

- A total of 2,437,746 LRTIs-related hospitalizations were analyzed (Influenza: 119,545; COVID-19: 704,540; RSV: 23,237; Other viral: 56,098; Bacterial: 309,220; Multiple-pathogen: 123,182; other/unknown pathogen: 1,101,924).
- Age, sex, race, and primary payor type distributions varied by pathogen types. (Figure 1)
- Influenza, RSV, and COVID-19 were more likely to occur in Winter season compared to bacterial and other viral infections. (Figure 2)
- Congestive heart failure, chronic pulmonary disease, diabetes, and renal disease were the most common comorbidities across all pathogen types. (Figure 3)
- Patients with multiple pathogen infection had the highest in-hospital mortality, AKI and hyperkalemia rates, followed by bacterial infection, COVID-19, and other viral infections.(Table 2)
- Sepsis and sepsis shock are common especially among patients with bacterial and multiple pathogen infections.(Table 2)
- Bacterial and multiple pathogen infections had the highest ICU admission rate and the longest LOS.(Figure 3)
- Total mean hospitalization cost and total mean hospital length of stay were highest for patients with multiple pathogen infection, followed by bacterial infection and COVID-19 infection. (Figure 4)

Figure 1. Primary payor distribution by pathogen type

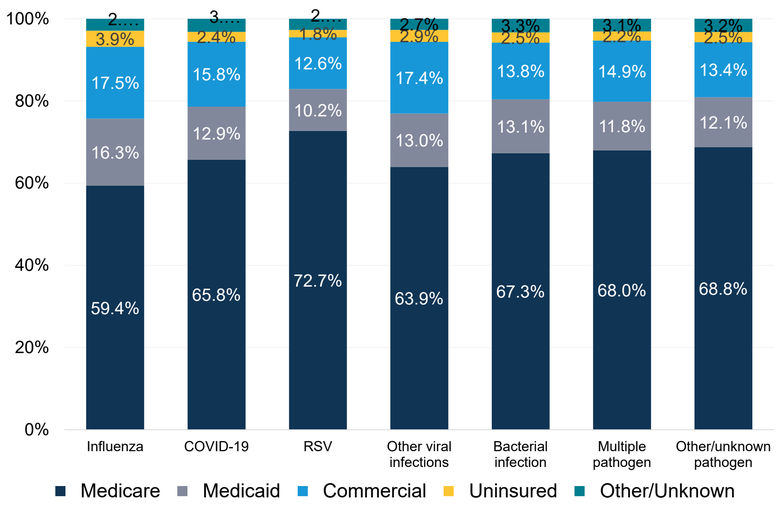

Figure 2. Seasonality of admission by pathogen type

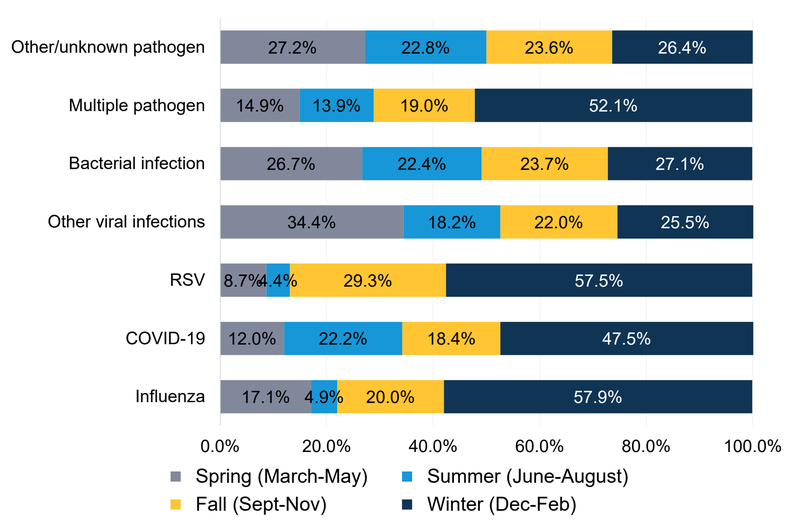

Table 1. Select Comorbidity Prevalence by Pathogen Type

	Influenza	COVID-19	RSV	Other viral infections	Bacterial infection	Multiple pathogen	Other/Unknown pathogen
Myocardial infarction	14.8%	14.7%	16.9%	14.8%	19.0%	18.0%	18.6%
Congestive heart failure	30.8%	28.8%	42.6%	37.0%	43.0%	37.1%	43.3%
Chronic pulmonary disease	50.3%	32.8%	60.8%	58.1%	59.5%	49.5%	54.5%
Diabetes	37.3%	38.5%	39.7%	36.9%	38.9%	40.0%	39.4%
Renal disease	39.5%	44.4%	44.2%	39.0%	51.0%	52.9%	48.6%

Table 2. Clinical outcomes by pathogen type

	Influenza	COVID-19	RSV	Other viral infections	Bacterial infection	Multiple pathogen	Other/ Unknown pathogen
In-hospital mortality	2.7%	5.5%	3.6%	3.2%	9.2%	13.5%	7.0%
AKI	25.1%	27.5%	23.6%	22.3%	34.2%	38.0%	30.2%
Hyperkalemia	6.3%	8.5%	8.5%	7.5%	12.1%	14.0%	9.9%
Invasive mechanical ventilation	3.1%	3.1%	3.5%	3.5%	10.0%	8.3%	5.7%
Sepsis or septic shock	25.3%	20.3%	24.4%	29.1%	51.2%	50.3%	39.2%

Table 3. ICU Admission and Mean ICU LOS by pathogen type

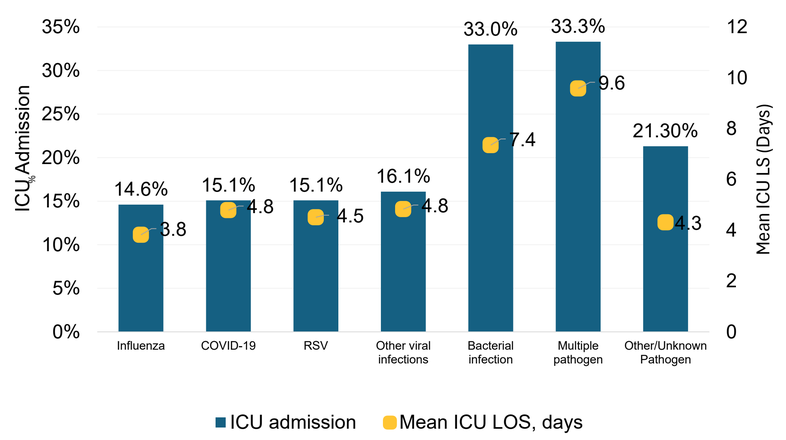

Figure 4. Total mean hospitalization cost and total mean hospital length of stay during 2022-2024 by pathogen type

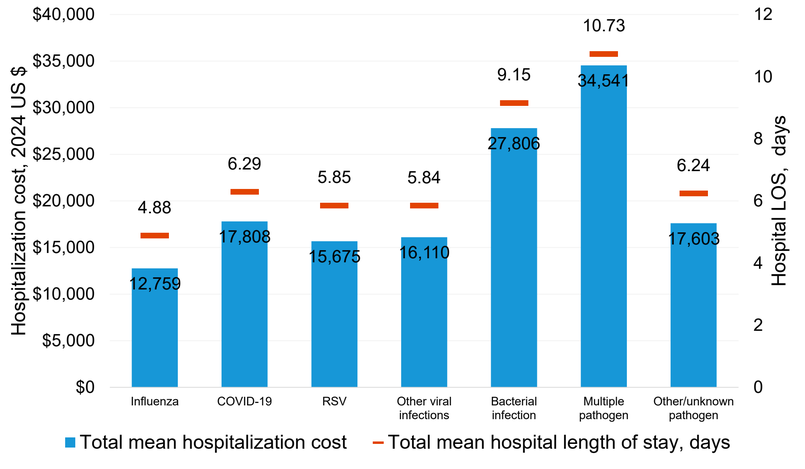

Table 3. Total projected national hospitalization cost in 2024 US$ during 2022-2024 by pathogen type.

- The total national hospitalization cost due to aLRTI was estimated to be over 201 billion 2024US$
- Hospitalizations due to other/unknown pathogen accounted for 42.8% of the total aLRTI-related hospitalization cost, followed by COVID-19 (26%), bacterial infection (17.2%), multiple pathogen infection (7.7%), and influenza (3.4%).

	Overall	Influenza	COVID-19	RSV	Other Viral Infection	Bacterial Infection	Multiple Pathogen	Other/ Unknown Pathogen
Weighted mean hospitalization cost	**$19,221**	$13,184	$17,902	$16,097	$16,408	$25,984	$29,829	$17,852
Projected total number of hospitalizations	**10,465,379**	516,868	2,927,021	101,802	239,986	1,334,850	522,318	4,822,534
Total Projected National Hospitalization Cost (in 2024US$)	**$201,149,969,695**	$6,814,376,437	$52,400,274,145	$1,638,733,753	$3,937,605,028	$34,684,924,279	$15,580,250,794	$86,093,805,260

CONCLUSIONS

- This large, national analysis showed that aLRTI-related hospitalizations post COVID-19 pandemic continue to have severe clinical outcomes, high healthcare resource utilization and high costs in the U.S..
- Bacterial and multiple pathogen aLRTI-related hospitalizations have the highest ICU admission rate and in-hospital mortality rate, and the longest ICU LOS and total LOS among all pathogens.
- COVID-19 related hospitalizations have higher in=hospital mortality rate, higher ICU admission, longer ICU LOS and total LOS, and higher cost compared to influenza-related hospitalizations.
- The national total hospitalization cost associated with aLRTI is estimated to be over 201 billion 2024US$ during 2022-2024 with over a quarter of such cost due to COVID-19-related hospitalizations.
- Increasing utilization of effective prevention measures (e.g., vaccination) among at-risk populations may help mitigate the burden of aLRTI-related hospitalizations.

LIMITATIONS

- aLRTIs were defined using ICD-10 diagnosis codes. Misclassification of pathogen type may exist due to potential errors in coding.
- Hospitalizations that include secondary aLRTI complications other than blood stream infection as primary diagnosis could have been missed, resulting in underestimation of the true burden of aLRTI

ACKNOWLEDGEMENT & DISCLOSURE

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