

Burden of Disease, Healthcare Resource Use and Costs of Respiratory Syncytial Virus Among Adults in Spain in 2021–2023 in the Hospital Setting: A Real-World Retrospective Observational Study of Four Hospitals

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In Spain, RSV infection is an important cause of ARI hospitalisation among adults that is associated with a substantial health and economic burden, yet, RSV burden may be underestimated due to reliance on ICD-10 coding.

Objectives



- To characterise the in-hospital burden of respiratory syncytial virus (RSV) versus coronavirus disease 2019 (COVID-19) and influenza in high-risk adults aged 18–49 years and all adults aged ≥50 years in Spain.
- To examine the concordance between microbiology-confirmed positive tests and International Classification of Diseases, 10th revision (ICD-10) diagnoses.

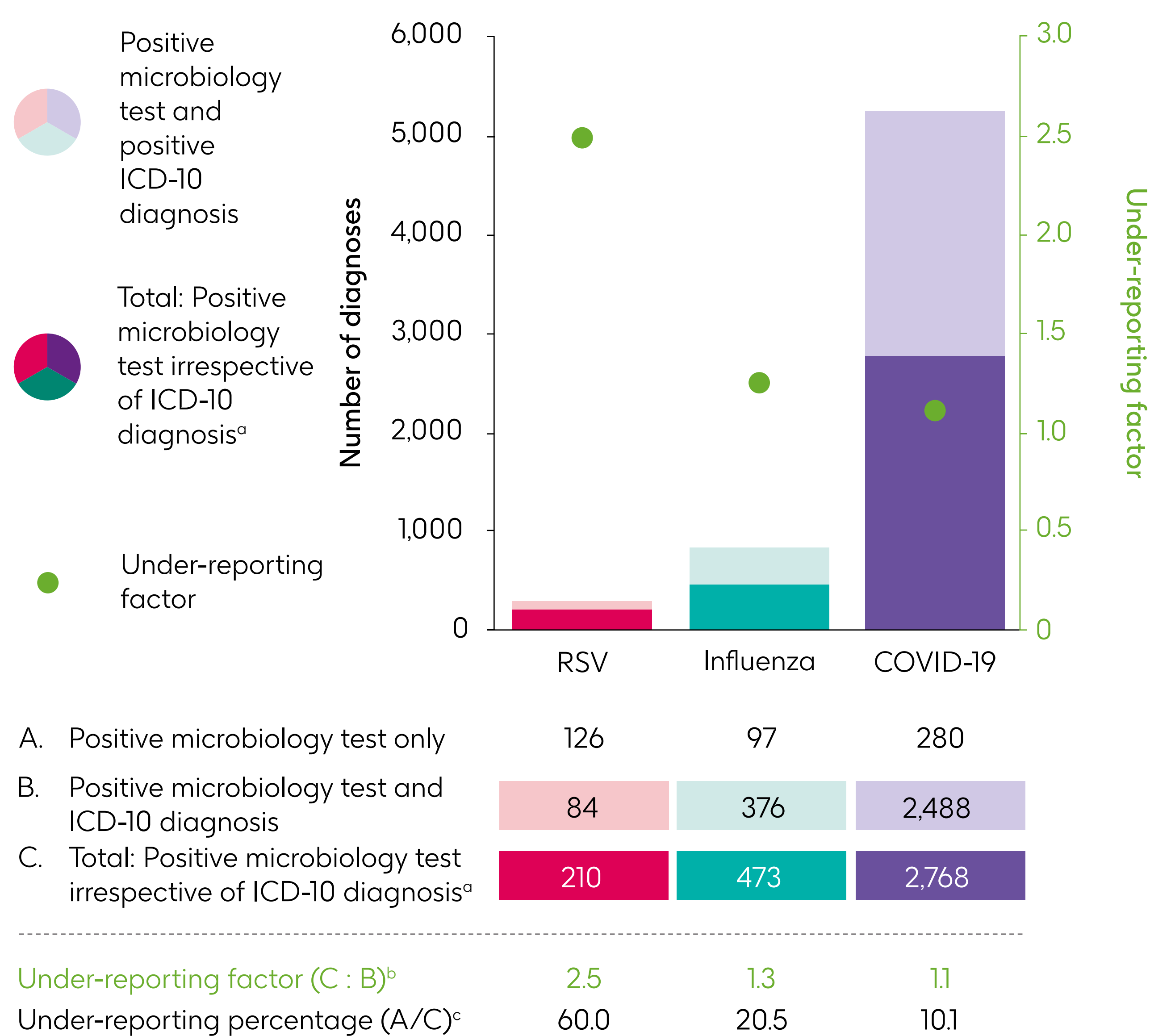
Methods

- This was an observational, retrospective, multi-centre cohort study using routinely-collected administrative data from four hospitals in Spain between 1st April 2021–31st March 2023 for:
 - High-risk adults aged 18–49 years with ≥1 comorbidity of interest: chronic obstructive pulmonary disease, asthma, any chronic respiratory/pulmonary disease, diabetes mellitus type 1 or 2, chronic heart failure and advanced liver or renal disease
 - All adults aged ≥50 years
- Acute respiratory illness (ARI)-related hospitalisations were identified using corresponding ICD-10 codes. For each hospitalisation, RSV, COVID-19 and influenza microbiology-confirmed positive tests were compared against ICD-10 diagnoses (**Supplementary Table 1**).
- For the three pathogens, in-hospital burden was measured as the number of hospitalisations and other healthcare resource utilisation (HCRU) and its associated costs.
- Hospitalisation length of stay (LoS), intensive care unit (ICU) admissions, ICU LoS, direct medical costs and in-hospital mortality were assessed descriptively.

Results

- There were 13,242 ARI-related hospitalisations, of which 13,079 (98.8%) had lower respiratory tract disease-specific ICD-10 diagnosis codes.
- Microbiology-confirmed positive tests were 2.5, 1.3 and 1.1 times higher than pathogen-specific ICD-10-coded diagnoses for RSV, influenza and COVID-19, respectively (**Figure 1**).
- Microbiology testing rates were 13.9% for RSV, 24.1% for influenza and 42.3% for COVID-19.

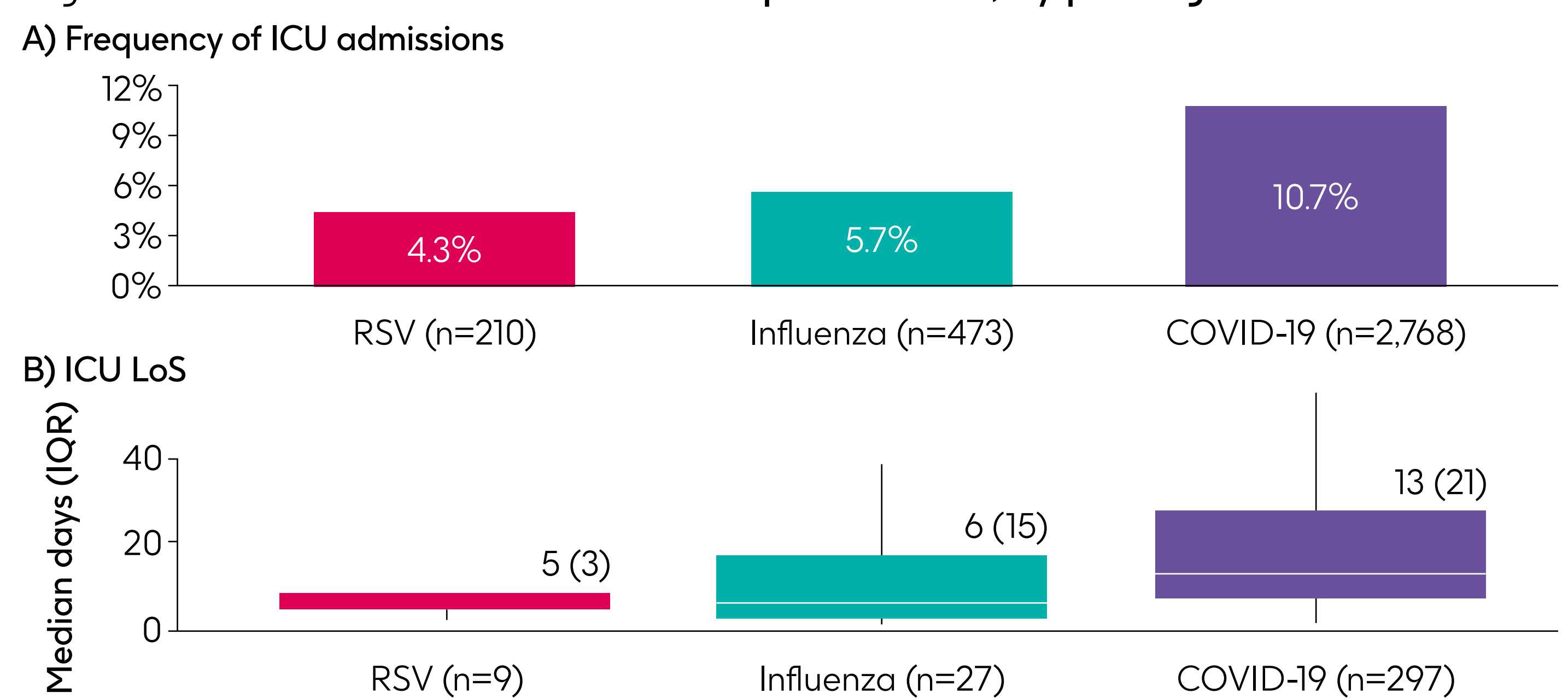
Figure 1: Comparison of microbiology-confirmed and pathogen-specific ICD-10 coded diagnoses of all ARI-related hospitalisations, by pathogen



ICD-10 codes available in **Supplementary Table 1**. Microbiological test results were classified per specific pathogen as positive, negative or no result. ^aIrrespective of positive or negative diagnosis based on ICD-10 coding. ^bRatio of the total number of microbiology confirmed cases (irrespective of ICD-10 diagnosis) to the number of cases with a positive microbiology test and accompanying ICD-10 diagnosis. ^cProportion of cases with a positive microbiology only (i.e. no ICD-10 diagnosis code) out of the total number of cases.

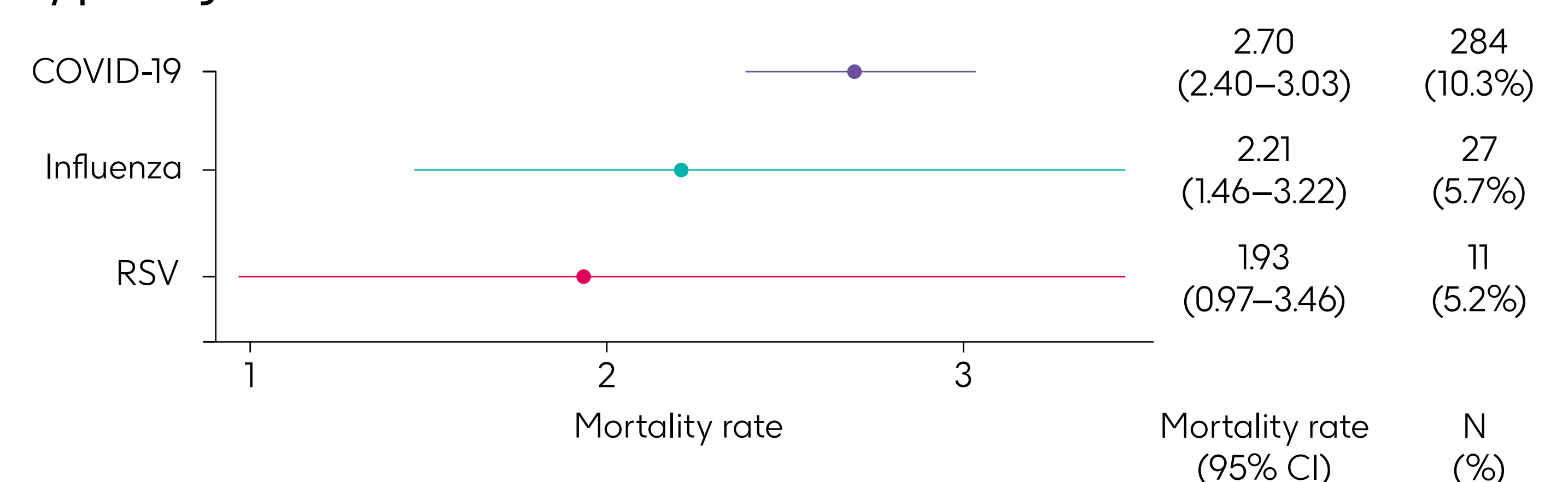
- The HCRU associated with RSV and influenza were comparable and lower than that of COVID-19:
 - Median hospitalisation LoS was 8 days (interquartile range: 6 days) for RSV, 7 (5) days for influenza and 9 (9) days for COVID-19.
 - Frequency of ICU admission was 4.3%, 5.7% and 10.7% for RSV, influenza and COVID-19, with a median ICU LoS of 5, 6 and 13 days, respectively (**Figure 2**).
 - In-hospital mortality rates were 1.93 (95% confidence interval: 0.97–3.46) for RSV, 2.21 (1.46–3.22) for influenza and 2.70 (2.40–3.03) for COVID-19 (**Figure 3**).
- Median (5th–95th percentile) direct healthcare costs were €4,108 (€2,963–€8,101) for RSV, €4,863 (€2,554–€6,156) for influenza and €5,013 (€4,178–€27,427) COVID-19 ARI-related hospitalisations (**Figure 4**).

Figure 2: ICU HCRU for ARI-related hospitalisations, by pathogen



Among microbiology-confirmed patients with a primary diagnosis. A) Number and percentage of patients with an admission to the ICU (for at least one day) within 90 days after discharge. B) The lower and upper limits of the box represent the first and third quartiles, respectively, and the white line within represents the median. The lower and upper edges of the whiskers represent the minimum and maximum values, respectively. Outliers not shown.

Figure 3: In-hospital all-cause mortality rate of ARI-related hospitalisations, by pathogen



Among microbiology-confirmed patients with a primary diagnosis. The lower and upper limits represent the 95% CI. The points represent the number of deaths per person-year of hospital admission.

Background

- RSV is a common, seasonal virus typically associated with paediatric populations; however, growing evidence has highlighted the significant disease burden and associated HCRU of RSV in adults.^{1–3}
- Furthermore, emerging data suggest that the true burden of RSV disease may be underestimated due to under-testing and under-diagnosis.^{4,5}
- While notable RSV-related hospitalisation rates have been reported among adults in Spain,⁶ the economic and healthcare burden in this population is poorly understood.

Conclusions



RSV was associated with a significant healthcare and economic burden among adults in Spain, approaching that of influenza and COVID-19.



Diagnosis based on ICD-10 coding alone substantially underestimates the burden of RSV, COVID-19 and influenza in Spain, with almost a third of RSV cases not captured by ICD-10 coding; incorporating microbiological data is essential for an accurate assessment.

Abbreviations

ARI, acute respiratory infection; CI, confidence interval; COVID-19, coronavirus disease 2019; ICD-10, International Classification of Diseases, 10th Revision; ICU, intensive care unit; IQR, interquartile range; LoS, length of stay; RSV, respiratory syncytial virus.

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Disclosures

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Supplementary Materials

Supplementary Table 1: ICD-10 codes used to define ARI hospitalisations related to RSV, influenza and COVID-19

ICD-10 code	Description
RSV-associated ARI	
J12.1	RSV pneumonia
J20.5	Acute bronchitis due to RSV
J21.0	Acute bronchiolitis due to RSV
B97.4	RSV as the cause of diseases classified elsewhere
Influenza-associated ARI	
J09	Influenza due to certain identified influenza viruses
J10.0	Influenza due to other identified influenza virus with pneumonia
J10.1	Influenza with other respiratory manifestations, seasonal influenza virus identified
J11.1	Influenza with other respiratory manifestations, virus not identified
J11.8	Influenza with other manifestations, virus not identified
COVID-19-associated ARI	
U07.1	COVID-19, virus identified
U07.2	COVID-19, virus not identified
B97.2	Coronavirus as the cause of the disease classified to other chapters
B34.2	Coronavirus infection, unspecified site

Abbreviations
ARI, acute respiratory infection; COVID-19, coronavirus disease 2019; ICD-10, International Classification of Diseases, 10th Revision; RSV, respiratory syncytial virus.