EPH203

Patients Characteristics, Vaccine Uptake, Healthcare Resource Utilization and Costs associated with acute COVID-19 during the Omicron predominant period in Brazil: A Nationwide Database Study

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INTRODUCTION

Brazil's health system has been significantly burdened by the coronavirus disease 2019 (COVID-19) pandemic. As of March 2023, there were over 37 million confirmed COVID-19 cases and 700 thousand COVID-19-related deaths reported in the country[1].

OBJECTIVE

This study assessed the impact of COVID-19 on Brazil between January and April 2022 when the Omicron variant was predominant in Brazil, with the aim:

- To describe demographic and clinical characteristics of patients, and overall vaccine uptake
- To assess healthcare resource utilization (HCRU) and costs associated with acute COVID-19

METHODS

- A population-based retrospective study was conducted using various Brazilian sources including COVID-19 related databases, public health systems, and other surveillance/demographic datasets such as:
  - Ministry of health COVID databases of SARS-Cov – the repository of the national COVID-19 surveillance[2], and COVID-19 vaccines – the national Vaccination against COVID-19 data[3]
  - The Brazilian Unified Health System “Sistema Único de Saúde” (SUS) databases of SIH-SUS (Inpatient Information System)[4] and SIA-SUS (Outpatient Information System)[5]
  - Brazilian Institute of Geography and Statistics (IBGE)[6] dataset for demographics and economic distribution, and Fiocruz Genomic[7] for variant predominance
- Individuals with positive COVID-19 test results between January and April 2022 were included.
- Definitions:
  - Acute or severe COVID-19: COVID-19 related hospitalization
  - Dose 1 (ongoing immunization): Individuals receiving only one dose out of two doses of primary series of vaccine(s), excluding individuals with one dose of Ad26.COV2.S vaccine
  - Dose 2 (full immunization): Individuals receiving both doses of primary series of vaccine(s) or one dose of Ad26.COV2.S vaccine
  - Booster or maintenance status: All shots received after full immunization
- Patients’ demographics, vaccination uptake and symptomatic COVID-19 infection status were described for the overall cohort by age group.
- HCRU and associated costs (i.e., public hospital-related) among individuals with acute COVID-19, who were admitted to hospitals, were reported by age group.
- Analysis was conducted in Microsoft Excel® and all costs were reported in Brazilian Real (R) 2022.

RESULTS

Patient Demographics and Clinical Characteristics

- A total of 8,160,715 COVID-19 cases were identified during the study period including 2.7% of age <5 years, 11.6% of 5-19 years, 76.9% of 20-64 years and 8.7% of ≥ 65 years.
- Vaccination uptake varied significantly by age group, ranging from less than 0.1% among young children of age <5 years for ongoing or full immunization, to more than 74.1% among individuals aged >19 years. Booster or maintenance vaccine uptake was significantly higher among individuals aged ≥ 65 years (74.8%+) than younger population.
- Among those with confirmed COVID-19, regardless of vaccination status, 87.2% were being symptomatic.

Table 1. Demographic and clinical characteristics of the study population during Jan-Apr 2022

	0-<5 yrs	5-<12 yrs	12-<19 yrs	19-<65 yrs	65-<75 yrs	≥ 75 yrs
Cohort (N), millions	14.7	20.5	24.1	133.0	13.8	8.8
Proportion of COVID-19 Cases (%)	2.7	4.5	7.1	76.9	5.3	3.4
Vaccination coverage (%)						
Unvaccinated	99.9	40.1	5.6	8.8	4.7	6.6
Dose 1	0.1	59.9	94.4	91.2	95.3	93.4
Dose 2	0.0	30.5	74.1	86.5	93.8	89.8
Booster dose	0.0	0.3	7.1	47.3	76.4	74.8
Symptomatic infection	87.3	86.0	86.6	87.5	85.5	85.1

Healthcare costs associated with acute COVID-19 infection

- Table 3 outlines direct healthcare costs associated with acute or severe COVID-19 infection for normal ward and ICU with/without MV support.
- The average cost per day in normal ward and ICU without MV was R$282.0 and R$1,157.0, respectively. While average cost per day in normal ward and ICU with MV was R$222.9 and R$1,213.5, respectively.
- Normal ward cost per day with/without MV was marginally higher for younger individuals aged <19 years (range: R$219.1-322.8) than 19+ adults (range: R$212.4-287.4). Whereas ICU cost per day with/without MV was significantly higher in 19+ adults (range: R$1,136.5-1,257.3) than younger individuals aged <19 years (range: R$658.6-1,048.0).

Table 3. Direct healthcare costs associated with acute COVID-19 infection, Per day (R$ 2022) during Jan-Apr 2022

	0-<5 yrs	5-<12 yrs	12-<19 yrs	19-<65 yrs	65-<75 yrs	≥ 75 yrs
Normal ward without MV	322.8	321.1	317.1	287.4	262.9	274.1
Normal ward with MV	269.4	270.3	219.1	223.3	212.4	223.2
ICU without MV	697.4	658.6	869.3	1,136.5	1,180.5	1,235.3
ICU with MV	721.6	720.1	1,048.0	1,203.8	1,242.0	1,257.3

COVID-19; coronavirus disease 2019; ICU, intense care unit; MV, mechanical ventilation; R$, Brazilian Real
Note: Reported costs were related to the public/general hospital setting only.

Healthcare resource utilization (HCRU) among hospitalized patients with COVID-19 infection (Table 2)

- Overall 1.7% of individuals with acute COVID-19 were hospitalized, ranging from 0.4% in 12-<19 years, 6.1% in 65-<75 years to 20.0% in ≥75 years. A hospitalization rate of 2.4% was reported for young children aged <5 years.
- Among hospitalized patients, 39,226 (32.6%) were admitted to ICU, of which, more than 70% of cases across the age groups required mechanical ventilation (MV) support.
- Hospitalization length of stay (LOS) was significantly higher for patients in ICU with MV support (range: 13.9-16.8) than ICU without MV (range: 9.1-13.8) and normal wards with/without MV support (range: 5.9-9.6).

Table 2. Healthcare resource utilization (HCRU) among hospitalized patients with acute or severe COVID-19 infection during Jan-Apr 2022

	0-<5 yrs	5-<12 yrs	12-<19 yrs	19-<65 yrs	65-<75 yrs	≥ 75 yrs
Number of overall hospitalization cases (N)	4,625	3,347	1,737	41,367	22,565	46,809
Hospitalization rate	2.4%	1.1%	0.4%	0.8%	6.1%	20.0%
Number of hospitalization, normal ward	3,519	2,567	1,348	28,684	14,215	30,891
MV rate, normal ward	35.7%	32.3%	24.3%	42.0%	55.5%	61.3%
ICU admission rate	23.9%	23.3%	22.4%	30.7%	37.0%	34.0%
Number of ICU admissions	1,106	780	389	12,683	8,350	15,918
MV rate, ICU	70.3%	71.4%	68.4%	76.7%	82.4%	82.2%
LOS, normal ward without MV	5.9	6.4	6.7	8.7	9.3	8.6
LOS, normal ward with MV	7.6	6.8	9.5	9.0	9.6	8.8
LOS, ICU without MV	9.4	11.0	9.1	12.8	13.8	13.5
LOS, ICU with MV	16.6	14.2	16.8	16.2	16.7	13.9

COVID-19; coronavirus disease 2019; ICU, intense care unit; LOS, length of stay in hospital; MV, mechanical ventilation; N, number of cases

LIMITATIONS

- This study was restricted to the publicly available COVID-19 data at the time of the study when Omicron variant was predominant in Brazil, which limits the generalizability of the study findings to other COVID variants, time periods or geographies.
- Details pertaining to certain cohort-specific characteristics such as gender, comorbidities, and medication usage were not available.
- HCRU associated costs were reported for only public/general hospitals, which may have undermined the actual burden as it did not account for the costs in commercial hospitals and other settings, which usually have relatively higher costs and charges.

CONCLUSION

- **Our study quantified the HCRU burden of acute or severe COVID-19 in Brazil during the Omicron predominant period, suggesting substantial healthcare resource requirement for adequate management of the COVID-19 pandemic.**
- **Despite the overall vaccination uptake of 74.5% for full immunization, 87.2% of the confirmed COVID-19 cases were symptomatic during the omicron predominant period, which emphasizes the importance of increasing booster/maintenance immunization in eligible population.**

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Disclosures

Yang J, Kyaw MH, Dantas A, Senna T, Holanda P, Spinardi JR are employees of Pfizer, Inc. and may hold stock or stock options. Cordeiro G and Longato M are employees of Analytix, Inc, which was a paid consultant to Pfizer in connection with the development of this study.

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