

# The impact of the COVID-19 pandemic on hospital-acquired infections at a comprehensive cancer center

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1209

## BACKGROUND & RESEARCH OBJECTIVE

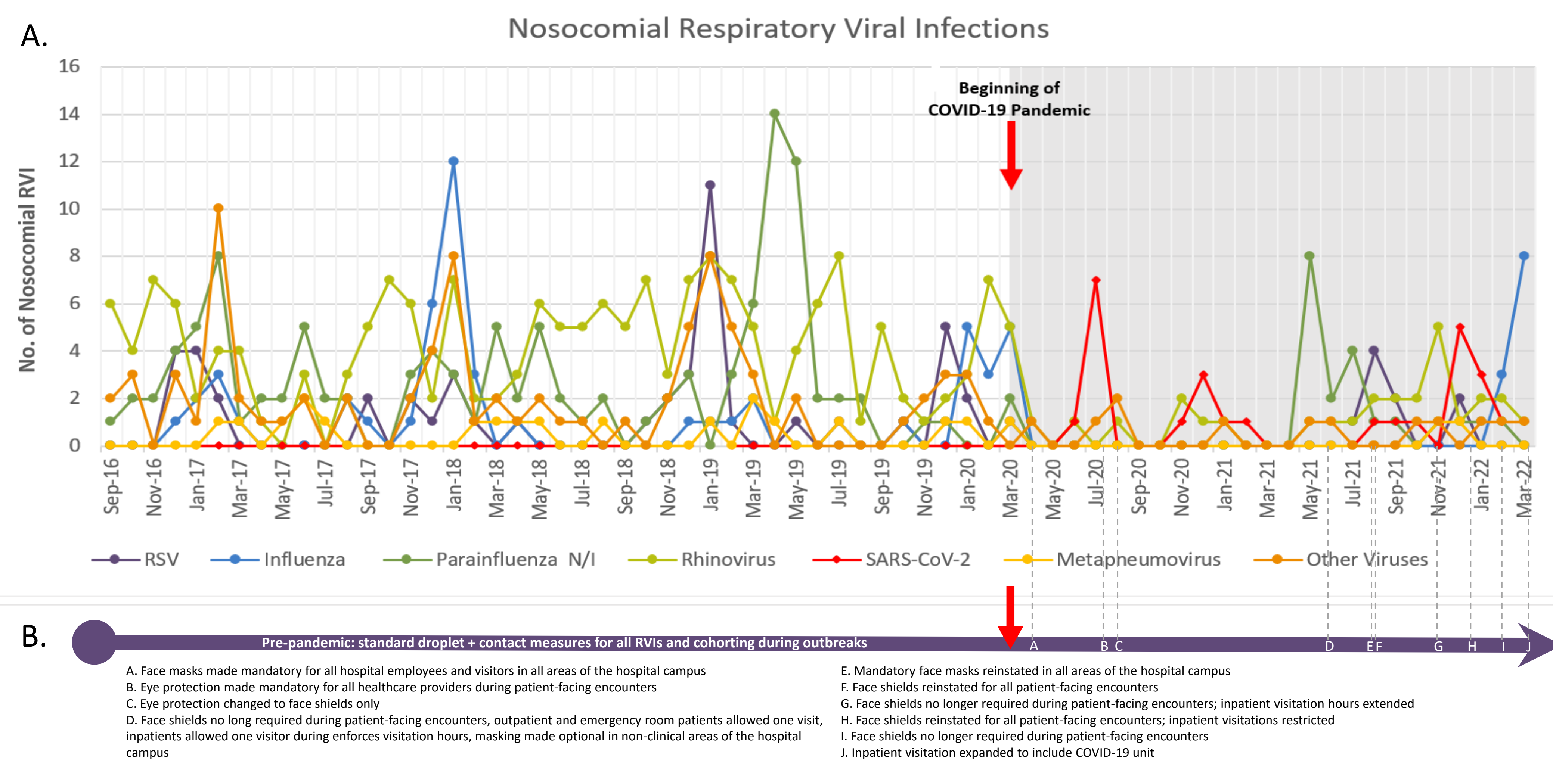
## METHODS

- Robust infection control (IC) measures were deployed across healthcare institutions at the start of the COVID-19 pandemic, resulting in increased use of personal protective equipment (PPE), enhanced contact precautions, and emphasis on hand hygiene
- The impact of these IC measures on the rates of hospital-acquired infections (HAIs) at our cancer center, such as multidrug-resistant organisms (MDROs), device-related infections (DRIs), Clostridium difficile infection (CDI), and respiratory viral infections (RVIs), is not known
- Here, we evaluated the effect of the enhanced IC practices on the occurrence of HAIs in our comprehensive cancer center

- We analyzed the monthly HAIs rates from September 2017 through March 2022, including 42 months of pre-pandemic (September 2016-February 2020) data and 24 months of data during the pandemic (March 2020-August 2021)
- Reported HAIs were calculated using denominators of patient days for CDI and MDROs, per 1,000 admissions for RVIs, and catheter days for DRIs. The incidence rate ratios (IRR) were calculated for all HAIs.
- Univariate and multivariate Poisson regression analysis was performed to evaluate the impact of antibiotic days and surge periods on the incidence rate of the different studies nosocomial infections
- IC precautions during COVID-19 surge periods were enhanced by augmenting visitation hours and mandated face shield utilization

## RESULTS

**Figure 1.** (A) Nosocomial respiratory viral infections diagnosed at MD Anderson Cancer Center prior to and during the COVID-19 pandemic and (B) a timeline of house-wide COVID-19-specific personal protective equipment (PPE) implementation



**Table 1.** Comparison of hospital-acquired infection incidence rates during pre-pandemic and pandemic periods.

Type of HAI	Pandemic (IR)	Pre-pandemic (IR)	IRR	95% CI	P value
MDROs Total	0.74	0.66	1.12	0.97-1.29	0.13
ESBL	0.37	0.31	1.20	0.97-1.47	0.08
PsA	0.04	0.03	1.3	0.71-2.41	0.37
CRE	0.05	0.05	0.99	0.56-1.73	0.96
LabID-MRSA	0.21	0.17	1.22	0.92-1.83	0.15
VRE	0.06	0.10	0.67	0.42-1.05	0.07
LabID-CDI	4.31	6.58	0.65	0.55-0.78	<0.001
<b>Device Related Infections</b>					
CAUTI	0.66	0.75	0.88	0.61-1.27	0.45
VAE	1.82	3.10	0.60	0.32-1.08	0.08
CLABSI	0.32	0.52	0.63	0.48-0.81	0.0003
RVI Total	1.90	5.24	0.36	0.30-0.44	<0.0001
RSV	0.15	0.51	0.30	0.15-0.61	0.0006
Influenza	0.24	0.50	0.50	0.27-0.88	0.015
Parainfluenza	0.34	1.21	0.28	0.18-0.45	<0.0001
Rhinovirus	0.50	1.91	0.26	0.18-0.38	<0.0001
Metapneumovirus	0.05	0.19	0.24	0.07-0.84	<0.023
Other Viruses	0.18	0.91	0.21	0.11-0.38	<0.0001

**Abbreviations.** IR, incidence rate; IRR, incidence rate ratio; MDRO, multidrug-resistant organisms; ESBL, extended spectrum beta-lactamase; PsA, Pseudomonas aeruginosa; CRE, carbapenem-resistant Enterobacterales; LabID, laboratory identified; MRSA, methicillin-resistant Staphylococcus aureus; CDI, Clostridium difficile infection; CAUTI, catheter-associated urinary tract infection; VAE, ventilator-associated events; CLABSI, catheter-associated bloodstream infection; RVI, respiratory viral infections; RSV, respiratory syncytial virus.

**Table 2.** The impact of antibiotic days on incidence density of Li-CDI by Poisson regression analysis

Antibiotic	Crude Ratio (per 10-day increase)	95% CI	p-value
Meropenem	0.88	0.76 to 1.01	0.077
Ertapenem	1.57	1.18 to 2.10	0.003
Cefepime	0.88	0.84 to 0.92	< .0001
Ceftriaxone	0.63	0.52 to 0.77	< .0001
Pip/ Tazo	1.13	1.08 to 1.19	< .0001
Levofloxacin	0.90	0.81 to 0.99	0.025
Ciprofloxacin	1.29	1.19 to 1.40	< .0001
Vancomycin	1.31	1.16 to 1.49	< .0001
Daptomycin	0.87	0.73 to 1.04	0.13
Linezolid	0.96	0.83 to 1.12	0.61

**Abbreviations.** Pip/Tazo, piperacillin/tazobactam; CI, confidence interval

## CONCLUSIONS

- Implementing strict IC measures during the COVID-19 pandemic in our cancer center led to a significant decrease in many HAIs and a reduction in nosocomial RVIs.
- Apart from a total and individual reduction of RVI NI, we were not able to delineate the impact of specific IC measures (e.g., universal masking, face shields, hand hygiene) during COVID-19 surge periods
- Whether these enhanced measures, such as masking at all times as part of patient care, are needed during the upcoming respiratory viral seasons is not known.

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- Overall, CDI, CLABSI, and total RVI incidence was significantly decreased during the pandemic when compared to pre-pandemic rates
- Overall RVI decreased, as did all individual RVI which is likely due to universal masking and low community rates during the COVID-19 pandemic
- There was a trend of increased incidence across all MRDO, but no individual significance was detected
- Days of cefepime (p<.0001) and vancomycin (p=0.011) used were factors that were independently associated with the incidence rate of nosocomial Li-CDI by multivariate analysis; however, the association was inversely related
- Despite modifications to IC precautions during COVID-19 surges, a comparison the IR of nosocomial RVI between surge vs non-surge periods did not reveal any difference