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Letter to the Editor

Decreased prevalence rate of respiratory pathogens in hospitalized patients during the COVID-19 pandemic: possible role for public health containment measures?

Yonatan Oster^{1,2}, Ayelet Michael-Gayego², Mila Rivkin³, Leonid Levinson³,
Dana G. Wolf^{1,2,3,†}, Ran Nir-Paz^{1,2,*,†}

¹ Faculty of Medicine, Hebrew University of Jerusalem, Jerusalem, Israel

² Department of Clinical Microbiology and Infectious Diseases, Hadassah Hebrew University Medical Center, Jerusalem, Israel

³ Clinical Virology Unit, Department of Clinical Microbiology and Infectious Diseases, Hadassah Hebrew University Medical Center, Jerusalem, Israel

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To the Editor,

The COVID-19 pandemic is associated with substantial morbidity and mortality, imposing an immense burden on health systems worldwide. One of the additional anticipated threats is the potential surge of other seasonal respiratory pathogens—influenza virus, respiratory syncytial virus (RSV) and others—which may result in further exhaustion of health resources. Recent reports from France, Finland and rural Alaska have shown a significant decrease in acute respiratory infections in children after the implementation of lockdown [1,2] and social distancing [3]. Moreover, recent winter surveillance data from Australia, Korea and Japan have demonstrated a decrease in seasonal influenza activity compared to previous seasons [4–6]. Hence, it is plausible that COVID-19 public health interventions are having a beneficial impact on the prevention of other respiratory pathogens.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first introduced into Israel in early March 2020 and has gained accelerated transmission since late March [8], triggering a national

response that included hand sanitation, voluntary social distancing, later with enforced temporary lockdown and school closure (12th to 31st March 2020), and the wearing of face masks (since 7th April 2020). Those measures resulted in a temporary containment of COVID-19.

We speculated that these interventions may have a restraining effect on the prevalence of other respiratory pathogens. Therefore, we compared the prevalence of non-SARS-CoV-2 respiratory pathogens in patients hospitalized at the Hadassah Medical Center (1100 inpatient beds tertiary medical centre in Jerusalem) during April–August 2020 with those total numbers observed in the previous 3 years. (For details of methods see Supplementary Material.)

From April through August 2020 there was a significant decrease in the number of patients who were tested for non-SARS-CoV-2 respiratory viruses compared to the 3 previous years (173 versus 1108 ± 171 ; Table 1 and Supplementary Material Table). Additionally, there was a notable decrease in the positive detection rates, with a significant reduction in the detection of human metapneumovirus (0/173, 0% versus mean $47.0 \pm 17.1/1108.0 \pm 171$, 4.2%, $p < 0.001$), parainfluenza 3 (1/173, 0.61% versus mean $45.3 \pm 15.3/1108.0 \pm 171$, 4.09%, $p 0.007$), and adenovirus (1/173, 0.60% versus mean $72.3 \pm 35.5/1108.7 \pm 171$, 6.52%, $p < 0.001$) (Table 1). For the other tested respiratory pathogens—except for *Mycoplasma pneumoniae* (0/223, 0% versus mean $28.7 \pm 11.9/499.3 \pm 144.8$, 5.74%, $p 0.001$)—the low seasonal prevalence resulted in difference that didn't reach significance. It should be noted that there were changes related to the hospital's clinical activity during the pandemic. This was noted on the routine vancomycin-resistant enterococcus (VRE) screening data which was performed by a separate team in the lab. During the period, there was a 49% reduction in VRE testing from an average of 5836.3 ± 1132.1 in 2017–2019 to 2976 tests in 2020.

Defining the effect of public health measures against COVID-19 on other major respiratory infections is essential for allocation and preparedness of health resources. Here, we have shown a significant decline in non-SARS-CoV-2 respiratory viruses in hospitalized

* Corresponding author: Ran Nir-Paz, Department of Clinical Microbiology and Infectious Diseases, Hadassah Hebrew University Medical Center, Jerusalem, Israel.

E-mail address: ran.nir-paz@mail.huji.ac.il (R. Nir-Paz).

† Dana G. Wolf and Ran Nir-Paz contributed equally.

Table 1
Respiratory pathogen testing and detection rates in April–August 2020 compared to April–August 2017–2019

	April–August 2017–19			April–August 2020			Reduction %	P-value
	Tests yearly mean \pm SD	Positive yearly mean \pm SD	Detection rate %	Total number of tests	Number of positives	Detection rate %		
Adenovirus	1108.7 \pm 171	72.3 \pm 35.5	6.52	173	1	0.60	91	<0.001
HMPV	1108.0 \pm 171	47.0 \pm 17.1	4.24	173	0	0.00	100	<0.001
Influenza A H3N2	1108.3 \pm 171	6.3 \pm 5.5	0.57	173	0	0.00	100	0.81
Influenza A H1N1	1106.7 \pm 171	8.7 \pm 8.1	0.78	173	0	0.00	100	0.53
Influenza B	1108.3 \pm 171	9.7 \pm 11.5	0.87	173	0	0.00	100	0.39
Parainfluenza 1	1108.0 \pm 171	15.7 \pm 18.0	1.41	173	1	0.61	55.6	0.60
Parainfluenza 2	1108.0 \pm 171	1.0 \pm 1.7	0.09	173	0	0.00	100	0.73
Parainfluenza 3	1108.0 \pm 171	45.3 \pm 15.3	4.09	173	1	0.61	85	0.007
RSV	1108.3 \pm 171	5.3 \pm 4.0	0.48	173	0	0.00	100	0.88
<i>Mycoplasma pneumoniae</i>	499.3 \pm 144.8	28.7 \pm 11.9	5.74	223	0	0.00	100	0.001
<i>Bordetella pertussis</i>	62.7 \pm 18.4	9.7 \pm 5.0	15.43	24	2	8.33	46	0.535

Test numbers are presented in *yearly means* \pm SD for 2017–2019 and *absolute number* for 2020; p was calculated for comparing number for positive/totals in 2020 versus the total numbers in 2017–2019. There was a reduction in vancomycin-resistant enterococcus (VRE) testing from an average of 5836.3 \pm 1132.1 (mean \pm standard deviation) in 2017–2019 to 2976 tests in April–August 2020, a reduction of 49%.

HMPV, human metapneumovirus; RSV, respiratory syncytial virus; SD, standard deviation.

patients following the implementation of COVID-19 control measures. This decline seemed to exceed the reduction in testing capacity or the decrease in non-COVID-19 hospital activity. During the study period mitigation measures included hand sanitation, partial lockdown, travel restrictions, school closure, and the mandatory use of face masks (April–Aug 2020). Therefore, we cannot determine the distinctive measure that had an impact. A surge in COVID-19 cases attributed to reduced adherence to the measures was documented in the Jerusalem area (and in other regions in Israel) from July. Still, this reduced adherence did not reverse the lower detection rate of other respiratory pathogens (Supplementary Material Table).

Our findings are in accordance with reports from other countries, as mentioned above. Even when controlling for the reduced non-COVID-19 hospital activity during the pandemic, our finding suggests that milder measures, which are not strict and potent enough to control COVID-19, may enable good containment of other respiratory pathogens.

Our study has some limitations, including the retrospective, single-centred nature of our analysis which involved hospitalized patients only. We did not change the routine for respiratory pathogens analysis in non-COVID-19 patients; testing for respiratory pathogens is not mandatory, but is performed in most of the patients admitted to medical wards. Additionally, the observed decreased number of tests/positivity rate may be related to a decrease in hospital admissions (especially in less severe cases) and to the decrease in testing referrals and testing capacity in this period of time. The reported decrease in acute respiratory syndromes and seasonal influenza activity in several countries supports the generalizability of our observations.

In conclusion, our findings—along with reports from the southern hemisphere—argue for the broader impact of anti-COVID-19 measures, and may hint that in the upcoming autumn and winter season (‘influenza and RSV season’) the burden associated with other common respiratory pathogens is likely to be reduced as long as anti-COVID-19 control measures are continued.

Research ethics

The study was approved by the Hadassah Medical Center Institutional Ethics Committee, approval number 0460-12.

Author contributions

DW and RNP: concept, design and supervision. YO, RNP and DW: writing, analysis and revision. AMG, MR, LL and RNP: data acquisition.

Transparency declaration

RNP reports shares in eDAS healthcare. YO, DW, MR, LL and AMG report no conflicts of interest. No external funding was used for this study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cmi.2020.12.007>.

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