

## Are we now observing an increasing number of coinfections between SARS-CoV-2 and other respiratory pathogens?

To the Editor,

We have recently read the article by Chaung et al<sup>1</sup> describing a case of SARS-CoV-2 and HCoV-HKU1 coinfection. The HCoV-HKU1 is also a member of the Betacoronavirus. In addition to other coronaviruses in different regions of the world, there is an increasing number of reports of coinfections in SARS-CoV-2/COVID-19. Then, we would like to take the opportunity to discuss some of them,<sup>1-10</sup> as there are not yet reviews on this emerging issue of COVID-19.

Currently, the evidence suggests that the coinfection rates between SARS-CoV-2 and other respiratory pathogens would be higher than initially expected, which represents a challenge for the diagnosis and treatment.<sup>1-4</sup>

Kim et al<sup>2</sup> described 1217 specimens of patients with respiratory symptoms; 116 of the 1217 samples (9.5%) were positive for SARS-CoV-2, and 318 (26.1%) were positive for a different microorganism. Of patients with confirmed SARS-CoV-2 infection, 20.7% (n = 24) were positive for one or more additional pathogens, of which the most common were rhinovirus/enterovirus (6.9%; n = 8), respiratory syncytial virus (5.2%; n = 6) and other coronaviruses (4.3%; n = 5).<sup>2</sup> Another study by Ding et al<sup>3</sup> included 115 patients with SARS-CoV-2 infection, 4.35% (n = 5) had influenza coinfection (three for influenza A; two for influenza B).<sup>9</sup> Also, Khodamoradi et al<sup>5</sup> reported a series of four cases that presented with severe pneumonia caused by coinfection between SARS-CoV-2 and type A Influenza.<sup>5</sup>

Ou et al<sup>6</sup> describe how a possible cause of the more severe expressions of COVID-19 could be the coinfection with other microorganisms such as *Haemophilus parainfluenzae* y *Moraxella catarrhalis*.<sup>6</sup> Arashiro et al<sup>4</sup> published a case report of a patient who debuted with severe acute respiratory distress associated with gastrointestinal symptoms, in whom a coinfection with SARS-CoV-2 y *Legionella pneumophila* was identified.<sup>4</sup>

COVID-19 arrived in Latin America and the Caribbean on 25 February 2020, when the Minister of Health of Brazil confirmed the first case, from that moment, there has been a massive outbreak spread in the region.<sup>1,3</sup> The first confirmed case of COVID-19 in Colombia was on 6 March 2020,<sup>6</sup> and as expected, the first case of coinfection in Colombia did not take a long time to be described. Recently, Orozco-Hernández et al<sup>7</sup> reported it in an obese young adult with coinfection by SARS-CoV-2 and rhinovirus/enterovirus,

who developed severe multilobar pneumonia requiring support in intensive care unit.<sup>7</sup>

Based on these reports, the use of the respiratory panel (RP) for the multiple pathogens identification (RP-FilmArray), as well as the performance of cultures for specific pathogens is recommended especially in severe cases or in scenarios where a positive result would change disease management (eg, for the identification of bacterial resistance or neuraminidase inhibitors for influenza in appropriate patients) to prevent disease progression or death.<sup>2-4,6</sup>

The identification of clinical and epidemiological risk factors of each patient that could suggest a coinfection by a virus, bacteria, and fungi, even three pathogens as Ou et al,<sup>6</sup> and Cuadrado-Payán et al<sup>10</sup> reported. Likewise, it is relevant that each country strengthens health systems and surveillance systems for infectious diseases, to achieve a timely identification, and thus guarantee the correct identification and management of the coinfecting patient. There are in summary at least ten reports of different coinfecting organisms isolated simultaneously with SARS-CoV-2 (Table 1).<sup>1-10</sup>

Even more, recently, two brief reviews without meta-analysis found additional cases,<sup>11,12</sup> although not necessarily included in the current assessment of coinfections. In one of them, published on 2 May 2020, they found that 8% of patients with COVID-19 experienced a bacterial/fungal coinfection during hospital admission, based on 18 studies included.<sup>11</sup> Nevertheless, this review only considered one of the included studies of the current article,<sup>2</sup> while the rest not.<sup>1,3-10</sup> In the second one, published online on 23 May 2020,<sup>12</sup> the authors suggested that coinfections would be a risk factor for fatal outcomes, as its prevalence could be up to 50% among non-survivors, however, they did not perform either a meta-analysis and did not include five of the reports included in our Table 1.<sup>1,6,7,9,10</sup> Then, all of these publications complement with the information on coinfections.

This call on the need for more research, as well as to consider the possibility of coinfections initially during the SARS-CoV-2/COVID-19. In addition to this emerging coronavirus, other pathogens that even may complicate the clinical evolution of the patients should be considered and diagnosed. The final question is, which is the prevalence and importance of coinfections in SARS-CoV-2/COVID-19.

**TABLE 1** Respiratory pathogens reported in coinfections with the SARS-CoV-2 laboratory-confirmed cases

	Kim et al <sup>2</sup> (n = 116)	Ding et al <sup>3</sup> (n = 115)	Khodamoradi et al <sup>5</sup> (n = 4)	Cuadrado-Payán et al <sup>10</sup> (n = 4)	Orozco-Hernández et al <sup>7</sup> (n = 1)	Chaung et al <sup>1</sup> (n = 1)	Arashiro et al <sup>4</sup> (n = 1)	Touzaud-Romo et al <sup>9</sup> (n = 1)	Wu et al <sup>8</sup> (n = 1)	Ou et al <sup>6</sup> (n = 1)
Virus, n (%)										
Rhinovirus/enterovirus	8 (6.9)	...	...	...	1 (100)	...	...	...	...	...
Respiratory syncytial virus	6 (5.2)	...	...	...	...	...	...	...	...	...
Other Coronaviridae	5 (4.3)	...	...	...	...	1 (100)	...	...	...	...
Influenza A	1 (0.9)	3 (2.6)	4 (100)	3 (75) <sup>a</sup>	...	...	...	...	1 (100)	...
Influenza B	...	2 (1.7)	...	2 (50) <sup>a</sup>	...	...	...	...	...	...
Metapneumovirus	2 (1.7)	...	...	...	...	...	...	1 (100)	...	...
Parainfluenza 1	1 (0.9)	...	...	...	...	...	...	...	...	...
Parainfluenza 3	1 (0.9)	...	...	...	...	...	...	...	...	...
Parainfluenza 4	1 (0.9)	...	...	...	...	...	...	...	...	...
Bacteria, n (%)										
<i>Moraxella catarrhalis</i>	...	...	...	...	...	...	...	...	...	1 (100) <sup>b</sup>
<i>Haemophilus parainfluenzae</i>	...	...	...	...	...	...	...	...	...	1 (100) <sup>b</sup>
<i>Legionella pneumophila</i>	...	...	...	...	...	...	1 (100)	...	...	...

<sup>a</sup>One patient had a triple coinfection (SARS-CoV-2, Influenza A and B).<sup>b</sup>One patient had a triple coinfection (SARS-CoV-2, *Moraxella catarrhalis*, and *Haemophilus parainfluenzae*).

## CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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