



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Letters to the Editor

Increasing legionella in Taiwan during COVID-19 pandemic



building water systems, which could further significantly increase the presence of Legionella. These findings were consistent with previous study conducted in 3 wards of a large regional hospital which revealed that all 3 wards' water network had higher contamination by *Legionella pneumophila* (after lockdown) compared to the period before the lockdown.² All these findings suggested the possible increased risk of Legionella exposure during COVID-19 pandemic. In contrast to most the other countries, Taiwan has a relative lower number of COVID-19 cases due to the aggressive infection control, and prevention.³ Moreover, many respiratory tract infections, such as influenza, invasive pneumococcal disease, and tuberculosis have been reduced at the same time under the implementation of these

Dear editor,

We read with great interest the recent study by Liang et al,¹ which demonstrated that prolonged building closures due to coronavirus disease 2019 (COVID-19) pandemic caused extreme stagnation in

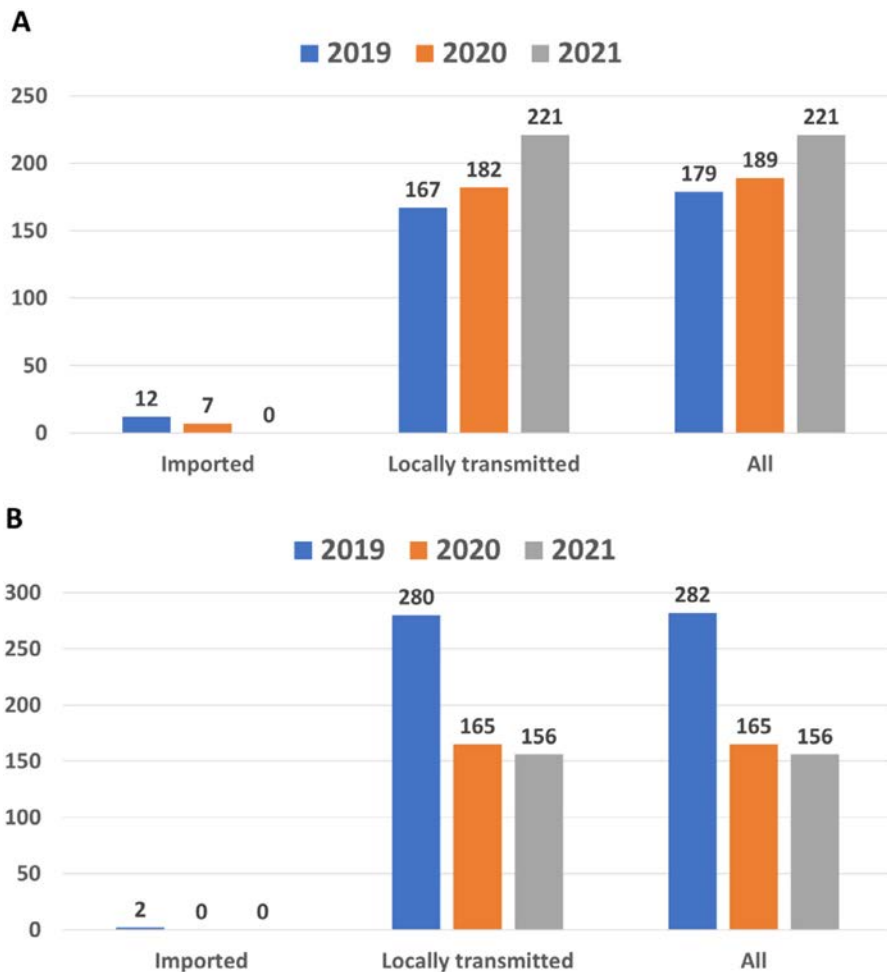


Fig 1. The case number of legionella (A) and invasive pneumococcal disease (B) between January and August in 2019, 2020, and 2021.

COVID-19 control measures.^{4–6} However, the clinical impact of COVID-19 on the Legionella disease was unclear. Therefore, we conduct this study to investigate the incidence of Legionella between, and during pandemic in Taiwan – a country with low burden of COVID-19.

We used the database of the National Notifiable Disease Surveillance System for analysis. This surveillance system could provide the regular, frequent, and timely information of notifiable infectious diseases in Taiwan.⁷ To assess the potential impact of COVID-19 on the occurrence of Legionella in Taiwan, we compared the number of the Legionella cases including locally transmitted and imported cases between January and August in 2019 (pre-pandemic), 2020 and 2021 (pandemic). In addition, we also collected the occurrence of invasive pneumococcal disease – another important pathogen of community-acquired pneumonia for comparison.

Overall, the total case number of Legionella increased from 179 in 2019 to 189 in 2020, and 221 in 2021 (Fig 1A). The increase of Legionella case during COVID-19 pandemic was observed for locally transmitted cases (167, 182, 221 in 2019, 2020 and 2021, respectively). In contrast, the number of imported Legionella cases decreased from 12 in 2019 to 7 in 2020, and even zero in 2021. About invasive pneumococcal diseases, their total case number largely decreased from 285 in 2019 to 165 and 156 in 2020 and 2021, respectively (Fig 1B). The similar trend of decreasing invasive pneumococcal disease was observed for locally transmitted cases and imported cases.

This study had 3 major findings. First, in contrast to most of the airborne and/or droplet transmitted notifiable infectious diseases showed decreasing trend due to the measures for the prevention and containment of COVID-19 outbreak in Taiwan, this study found that Legionella disease was increasing during COVID-19 pandemic in Taiwan, which echoed the findings of Liang et al's study. However, we only investigated the trend of notifiable Legionella diseases, we did not exam the prevalence of Legionella in the water system. In addition, lock down was not conducted in Taiwan. Therefore, further study is warranted to investigate the impact of water system on the increasing Legionella during pandemic in Taiwan.

Second, in line with previous report,⁶ this study found the number of invasive pneumococcal disease in Taiwan decreased during pandemic, compared to pre-pandemic. This finding was supposed to be caused by aggressive COVID-19 control measures, particularly for universal masking in Taiwan.

Finally, we found the imported case number of Legionella and invasive pneumococcal disease had decreased or even became zero from 2019 to 2020 and 2021. This reduction could be caused by the implementation of border control in Taiwan since the early outbreak of COVID-19.

In conclusion, Liang et al's study¹ reminded us possible increasing risk of Legionella exposure after lock down, and we demonstrated Legionella disease was increasing during pandemic in Taiwan. Both these findings suggest that clinician should keep alert the development of Legionella disease during COVID-19 pandemic.

References

1. Liang J, Swanson CS, Wang L, He Q. Impact of building closures during the COVID-19 pandemic on legionella infection risks. *Am J Infect Control*. 2021;S0196-6553:00592–00595.
2. De Giglio O, Diella G, Lopuzzo M, et al. Impact of lockdown on the microbiological status of the hospital water network during COVID-19 pandemic. *Environ Res*. 2020;191: 110231.

3. Lai CC, Yen MY, Lee PI, Hsueh PR. How to keep COVID-19 at bay: a Taiwanese perspective. *J Epidemiol Glob Health*. 2021;11:1–5.
4. Fang JL, Chao CM, Tang HJ. The impact of COVID-19 on the diagnosis of TB in Taiwan. *Int J Tuberc Lung Dis*. 2020;24:1321–1322.
5. Kuo SC, Shih SM, Chien LH, Hsiung CA. Collateral benefit of COVID-19 control measures on influenza activity, Taiwan. *Emerg Infect Dis*. 2020;26:1928–1930.
6. Juan HC, Chao CM, Lai CC, Tang HJ. Decline in invasive pneumococcal disease during COVID-19 pandemic in Taiwan. *J Infect*. 2021;82:282–327.
7. Taiwan CDC. Accessed September 22, 2021. <https://nidss.cdc.gov.tw/>.

Conflicts of interest: None

Chien-Ming Chao, MD
Chih-Cheng Lai, MD*

¹ Department of Intensive Care Medicine, Chi Mei Medical Center, Liouying, Tainan, Taiwan

² Department of Internal Medicine, Kaohsiung Veterans General Hospital, Tainan Branch, Tainan

* Address correspondence to Chih-Cheng Lai, MD, Department of Internal Medicine, Kaohsiung Veterans General Hospital, Tainan Branch, Tainan

E-mail address: dtmed141@gmail.com (C.-C. Lai).

<https://doi.org/10.1016/j.ajic.2021.10.024>

Impact of the COVID-19 pandemic on the incidence of multidrug-resistant bacterial infections in an acute care hospital in Brazil



Dear editor,

We appreciate the contribution of Lima et al to the discussion of this important issue. While their results appear different, it is important to appreciate the numerous differences in our methodologies when making that comparison. (1) While we both analyzed the incidence of MDR infections, Lima et al looked only at ICU populations, while we looked more broadly at all inpatient units (ICU and non-ICU). (2) Lima et al considered CRAB, while we looked at 5 pathogens, noting differences in CRAB and MRSA. (3) The median of *Acinetobacter baumannii* MDR infections calculated by Lima et al is per patient-day/100 beds, while our median was calculated using the number of MDR infection cases in the period as numerator and the number of patient-days in the same period multiplied by 1,000. (4) While we both used the same statistical test to compare medians (Mann-Whitney), we used different denominators.¹ (5) Our definitions of MDR are also different. While Lima et al considered MDR to be a pathogen resistant to at least 1 agent in 3 or more categories of antimicrobials,² we used the definition for *A. baumannii* of resistance to the carbapenem class, which is one of the main drugs for the treatment of serious infections caused by them.

Our approach to analysis also differed due to different objectives. We agree with Lima et al that time series analysis is the preferred