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.

personal protective equipment, and reducing patient transport for imaging studies. Nurses and respiratory therapists can also be easily trained to perform focused ultrasound assessments.[5,6]

During the current pandemic, disease containment and provider safety are high priorities. We must embrace emerging technologies such as handheld ultrasound devices to allow us to achieve these aims while providing high quality care to our patients.

References

1. American College of Radiology, ed. *ACR Recommendations for the Use of Chest Radiography and Computed Tomography (CT) for Suspected COVID-19 Infection*. 2020, American College of Radiology; 2020.. Edited by; https://www.acr.org/Advocacy-and-Economics/ACR-Position-Statements/Recommendations-for-Chest-Radiography-and-CT-for-Suspected-COVID19-Infection.
2. Picano E, Scali MC, Ciampi Q, Lichtenstein D. Lung ultrasound for the cardiologist. *JACC Cardiovasc Imaging*. 2018;11:1692–1705.
3. Lichtenstein D. Lung ultrasound in the critically ill. *Curr Opin Crit Care*. 2014;20:315–322.
4. Westerway SC, Basseal JM. The ultrasound unit and infection control - Are we on the right track? *Ultrasound*. 2017;25:53–57.
5. Tulleken AM, Gelissen H, Lust E, et al. UltraNurse: teaching point-of-care ultrasound to intensive care nurses. *Intensive Care Med*. 2019;45:727–729.
6. Karthika M, Wong D, Nair SG, Pillai LV, Mathew CS. Lung ultrasound: the emerging role of respiratory therapists. *Respir Care*. 2019;64:217–229.
7. Kramer A, Schwebke I, Kampf G. How long do nosocomial pathogens persist on inanimate surfaces? A systematic review. *BMC Infect Dis*. 2006;6:130.
8. Otter JA, Donskey C, Yezli S, Douthwaite S, Goldenberg SD, Weber DJ. Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. *J Hosp Infect*. 2016;92:235–250.
9. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med*. 2020;382:1564–1567.

Conflicts of Interests: L.E.G. reports none. E.A.B. reports none. M.G.C. reports none.
Authors' contributions: L.E.G., E.A.B., and M.G.C. wrote and reviewed the article.

Lauren E. Gibson, MD
Edward A. Bittner, MD, PhD
Marvin G. Chang, MD, PhD*
Department of Anesthesia, Critical Care, and Pain Medicine, Massachusetts General Hospital, Boston, MA, USA

* Address correspondence to Marvin G. Chang, Massachusetts General Hospital, 55 Fruit Street, WHT 437, Boston, MA 02114
E-mail address: mgchang@mgh.harvard.edu (M.G. Chang).

https://doi.org/10.1016/j.ajic.2020.05.041

Chest tube with air leaks is a potential "super spreader" of COVID-19

To the Editor:

The COVID-19 pandemic has spread worldwide, causing more than 5.8 million infections at present (May 30, 2020).[1] Infectious aerosols disperse during aerosol-generating procedures such as tracheal intubation.[2] There is a concern that aerosols may also be generated from the chest tube, especially with air leaks, even after placement.[3] We would like to share our experience.

An 85-year-old man was admitted to our hospital with fever, cough, and dyspnea. Chest computed tomography revealed unilateral pleural effusion and no findings of pneumonia. We performed chest tube drainage and diagnosed an acute empyema with a bronchopleural fistula causing persistent air leaks. Three days later, screening RT-PCR assays for COVID-19 were positive for the patient and his 5 nurses. We strictly used personal protective equipment; nevertheless, another 7 people (2 physicians and 5 nurses) associated with the patient were infected with COVID-19. The outbreak of COVID-19 in our hospital was thought to be related to aerosols produced by the chest tube with air leaks. For the outbreak, we could not rule out accidental hospital-acquired infection or community-acquired infection.

Further research is required to determine whether chest tubes with air leaks are a source of infectious aerosols. However, we clinicians should be attentive to the risk of nosocomial infection with COVID-19 due to chest tubes. To prevent aerosols, closing the safety valve of a suction system is proposed.[3] It is important to note that the intrathoracic pressure will increase and tension pneumothorax may occur if the suction system is switched off with the valve closed.

References

1. World Health Organization. Coronavirus disease (COVID-2019) situation reports. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/. Published 2020. Accessed May 30, 2020.
2. Van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med*. 2020;382:1564–1567.
3. Bilkhu R, Viviano A, Saftic I, Billè A. COVID-19: chest drains with air leak – the silent 'super spreader'?Available at: https://ctsnet.figshare.com/articles/COVID-19_Chest_Drains_With_Air_Leak_The_Silent_Super_Spreader_/12089130/1. Published 2020. Accessed May 30, 2020.

Funding: None.
Conflicts of interest: All authors report no conflicts of interest relevant to this article.

Hiroshi Sugimoto, MD*
Department of Respiratory Medicine, Kobe Red Cross Hospital, Kobe, Japan

Takuya Kohama, MD
Department of Thoracic Surgery, Kobe Red Cross Hospital, Kobe, Japan

* Address correspondence to Hiroshi Sugimoto, MD, Department of Respiratory Medicine, Kobe Red Cross Hospital, 1-3-1 Wakinohama Kaigan-dori, Chuo-ku, Kobe 651-0073, Japan
E-mail address: dr.sugimoto@gmail.com (H. Sugimoto).

https://doi.org/10.1016/j.ajic.2020.06.001

Cautious handling of urine from moderate to severe COVID-19 patients

To the Editor,

Since December 2019, coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-

Table 1
Patient demographics, comorbidities, disease severity, and results of SARS-CoV-2 qRT-PCR in urine

Patient No.	Age (years)	Sex	Race	Comorbidities	Severity	Days from disease onset to testing of urine	Hospital day	qRT-PCR in urine
1	21	Female	Asian	None	Mild	2	1	UND
2	70	Male	White	Dementia	Mild	2	2	UND
3	53	Male	White	None	Mild	4	1	UND
4	46	Male	Asian	DM	Mild	5	1	UND
5	62	Male	Asian	DL	Mild	6	1	UND
6	41	Male	Asian	None	Mild	7	8	UND
7	54	Male	Asian	None	Mild	11	10	UND
8	29	Male	Asian	None	Mild	13	1	UND
9	29	Female	Asian	None	Mild	28	19	UND
10	43	Male	Asian	None	Moderate	2	1	UND
11	53	Male	Asian	HTN, DL	Moderate	4	1	UND
12	53	Male	Asian	None	Moderate	5	4	Ct value: 38.6, VL: 840 copies/mL
						8	7	UND
13	31	Male	Asian	None	Moderate	10	1	UND
14	28	Male	Asian	None	Moderate	10	3	UND
15	44	Male	Asian	None	Moderate	11	8	UND
16	68	Male	Asian	Post kidney transplant, HTN, OMI	Moderate	15	1	UND
17	83	Male	Asian	HTN	Moderate	16	1	UND
18	63	Male	White	Obesity	Severe	6	1	UND
19	72	Male	Asian	DM, HTN	Severe	7	1	Ct value: 38.7, VL: 800 copies/mL
						11	5	Ct value: 40.6, `VL: 254 copies/mL
						17	11	UND
20	42	Male	Asian	HTN	Severe	9	3	UND

Ct, cycle threshold; *DM*, diabetes mellitus; *HTN*, hypertension; DL, dyslipidemia; *OMI*, old myocardial infarction; *qRT-PCR*, quantitative real-time polymerase chain reaction; *SARS-CoV-2*, severe acute respiratory syndrome-coronavirus 2; *UND*, undetected; *VL*, viral load.

CoV-2), has spread worldwide.[1] Upper and lower respiratory tract specimens are screened using quantitative reverse transcription polymerase chain reaction (qRT-PCR) to identify individuals infected with SARS-CoV-2. The virus has also been detected in other specimens, such as the blood, stool, and urine.[2-4] Although the duration of SARS-CoV-2 viral shedding in the upper and lower respiratory tract and stool has been reported,[5-7] limited data are available for that in the urine.

Here, we investigated the detectability and duration of SARS-CoV-2 RNA in the urine among patients with different severities of COVID-19.

METHODS

From February 7, 2020 to March 24, 2020, we evaluated the presence of SARS-CoV-2 RNA in the urine of patients admitted to the National Center for Global Health and Medicine, a tertiary care institution in Tokyo, Japan. The patients had been diagnosed with COVID-19 by qRT-PCR using nasal or pharyngeal swab specimens.[8] Information on demographics, comorbidities, disease severity, number of days from the onset of COVID-19 to the testing of urine, and qRT-PCR results in the urine (cycle threshold [Ct] values and viral load [VL] as virus copies/mL) were collected. Disease severity was defined as follows: a patient without oxygen demand, mild; a patient with oxygen demand, moderate; and a patient requiring a ventilator to treat respiratory failure, severe. The study protocol was approved by the institutional review board (approval no: NCGM-G-003472-02), and written informed consent for publication was obtained from each patient.

RESULTS

Twenty-three specimens from 20 patients were collected (Table 1). The median age of this cohort was 49.5 years (range: 21–83 years), and 90.4% were men. According to the clinical course, 9 (45.0%), 8 (40.0%), and 3 (15.0%) patients had mild, moderate, and severe disease, respectively. The median number of days from the onset of COVID-19 to urine testing was 7 days (range: 2-28 days). One patient each with moderate and severe conditions tested positive for SARS-CoV-2 RNA in the urine. The proportions of patients with urine samples positive for SARS-CoV-2 RNA among the mild, moderate, and severe cases were 0 of 9 (0%), 1 of 8 (12.5%), and 1 of 3 (33.3%), respectively. Patient no. 12 (moderate) tested positive for SARS-CoV-2 RNA in the first urinalysis (Ct value: 38.6, VL: 840 copies/mL) but not at 3 days after the positive result. Patient no. 19 (severe) was admitted to the hospital on illness day (ID) 7 from onset and tested positive for the presence of SARS-CoV-2 RNA in the urine (Ct value: 38.7, VL: 800 copies/mL). During the clinical course, he developed severe pulmonary dysfunction on ID 9 and required intensive care, including a mechanical ventilator and venovenous extracorporeal membrane oxygenation. He remained positive for SARS-CoV-2 RNA in the urine on ID 11 (Ct value: 40.6, VL: 254 copies/mL). On ID 15, continuous renal replacement therapy was required. SARS-CoV-2 RNA was not detected in the urine on ID 17. Finally, the patient passed away on ID 45.

DISCUSSION

During the study period, SARS-CoV-2 RNA was detected in the urine of two of 20 patients (10%). Only 2 previous reports have evaluated the presence of this virus in urine.[2,3] In one study, the virus was detected in 1 of 9 patients (11.1%).[2]Another study examined urine specimens from 72 patients; however, no patients tested positive for SARS-CoV-2 RNA.[3] Although these studies did not evaluate the severity of disease in the tested patients,we considered the severity of disease in patients who were positive for SARS-CoV-2 RNA. No patients with mild disease tested positive for SARS-CoV-2

RNA; however, one patient each in the moderate and severe groups had SARS-CoV-2 RNA in the urine. Thus, we showed that SARS-CoV-2 RNA could be excreted in the urine for at least 4 days. This duration is relatively short compared with those of other specimens, such as pharyngeal swabs (up to 30 days) and stools (14-18 days).[4-6] COVID-19 transmission among health care workers has become a major problem worldwide[8]; thus, health care workers should carefully handle urine samples from patients with the moderate to severe disease.

There were several limitations to this study. First, because of the small number of patients enrolled, the relationship between clinical severity and SARS-CoV-2 RNA detection in the urine could not be established. Second, we did not evaluate the infectious potential of the virus in the urine. However, a previous study indicated that SARS-CoV-2 RNA isolated from urine might be infectious.[9] An autopsy case suggesting direct infection of the renal tubular epithelium was also reported.[10] Together, these reports indicate that SARS-CoV-2 RNA in the urine is infectious.

In conclusion, our results suggest that SARS-CoV-2 RNA may be excreted in the urine depending on the severity of COVID-19. Although the period of viral shedding in the urine is relatively short, HCWs should also take infection prevention and control measures when handling urine, particularly samples from patients with moderate to severe COVID-19.

Acknowledgments

We thank the clinical staff at the National Center for Global Health and Medicine for their dedication to clinical practice and patient care, and RyotaKumagai, PhD and Takashi Chiba, MT, PhD at the Department of Microbiology, Tokyo Metropolitan Institute of Public Health, Tokyo, Japan for analysis of SARS-CoV-2 RNA.No specific financial support was provided for this study.

References

1. Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. *New Engl J Med*. 2020;382:727–733.
2. Peng L, Liu J, Xu W, et al. SARS-CoV-2 can be detected in urine, blood, anal swabs, and oropharyngeal swabs specimens [e-pub ahead of print]. *J Med Virol*. https://doi.org/10.1002/jmv.25936. Accessed June 26, 2020.
3. Wang W, Xu Y, Gao R, et al. Detection of SARS-CoV-2 in different types of clinical specimens. *JAMA*. 2020;323:1843–1844.
4. Hosoda T, Sakamoto M, Shimizu H, Okabe N. SARS-CoV-2 enterocolitis with persisting to excrete the virus for approximately two weeks after recovering from diarrhea: a case report. *Infect Control Hosp Epidemiol*. 2020;41:753–754.
5. Hu Y, Shen L, Yao Y, Xu Z, Zhou J, Zhou H. A report of three COVID-19 cases with prolonged viral RNA detection in anal swabs. *Clin Microbiol Infect Dis*. 2020;26:786–787.
6. Zhou B, She J, Wang Y, Ma X. The duration of viral shedding of discharged patients with severe COVID-19 [e-pub ahead of print]. *Clin Infect Dis*. https://doi.org/10.1093/cid/ciaa451. Accessed June 26, 2020.
7. Nagashima M, Kumagai R, Yoshida I, et al. Characteristics of SARS-CoV-2 isolated from asymptomatic carrier in Tokyo [e-pub ahead of print]. *Jpn J Infect Dis*. https://doi.org/10.7883/yoken.JJID.2020.137. Accessed June 26, 2020.
8. CDC COVID-19 Response Team. Characteristics of health care personnel with COVID-19 — United States, February 12–April 9, 2020. Centers for disease control and prevention. *MMWR Morb Mortal Wkly Rep*. 2020;69:477–481.
9. Sun J, Zhu A, Li H, et al. Isolation of infectious SARS-CoV-2 from urine of a COVID-19 patient. *Emerg Microbes Infec*. 2020;9:991–993.
10. Evan A, Allecia M, Jeffrey M. Ultrastructural evidence for direct renal infection with SARS-CoV-2. *J Am Soc Nephrol*. 2020. ASN.2020040432.

Conflict of interest: There are no conflicts of interest to declare.

Hidetoshi Nomoto, MD
Masahiro Ishikane, MD, PhD*
Daisuke Katagiri, MD, PhD, FASN
Noriko Kinoshita, MD
Mami Nagashima, MT
Kenji Sadamasu, DVM, PhD
Kazuhisa Yoshimura, MD, PhD
Norio Ohmagari, MD, MSc, PhD
[a] *Disease Control and Prevention Center, National Center for Global Health and Medicine, Tokyo, Japan*
[b] *Collaborative Chairs Emerging and Reemerging Infectious Diseases, National Center for Global Health and Medicine, Graduate School of Medicine, Tohoku University, Sendai city, Miyagi, Japan*
[c] *AMR Clinical Reference Center, Disease Control and Prevention Center, National Center for Global Health and Medicine, Shinjuku-ku, Tokyo, Japan*
[d] *Department of Nephrology, National Center for Global Health and Medicine, Shinjuku-ku, Tokyo, Japan*
[e] *Department of Microbiology, Tokyo Metropolitan Institute of Public Health, Shinjuku-ku, Tokyo, Japan*

* Address correspondence to Masahiro Ishikane, MD, PhD, Disease Control and Prevention Center, National Center for Global Health and Medicine, 1-21-1 Toyama, Shinjuku-ku, Tokyo, 162-8655, Japan.
E-mail address: ishikanemasahiro@gmail.com (M. Ishikane).

https://doi.org/10.1016/j.ajic.2020.05.034

Mobile phones: A forgotten source of SARS-CoV-2 transmission

Dear editor,

The emergence SARS-CoV-2, a novel coronavirus, has become a global health and economic concern, embodying one of the most disruptive pandemics in more than a century. SARS-CoV-2 is highly contagious via droplets and could be spread by human contact as well as contaminated surfaces causing high morbidity and mortality burden.[1] Consequently, the world's economy has shut down, and nearly one-third of the worlds' population has been forced to home confinement. With the deconfinment phase to start soon in different countries, educating the population to adopt preventive measures has become crucial to limit a second wave of SARS-CoV-2 infection. These measures include physical distancing, washing hands regularly with soap and water or sanitizers, avoid face-touching, and wearing facemask especially in public and crowded places. In addition, the use of mobile phone (MP) applications has been proposed to help track infected individuals. However, there is 1 caveat. MP could be a source