

Report of five nurses infected with severe acute respiratory syndrome coronavirus 2 during patient care: case series

A. Gheysarzadeh^{1,2}, N. Sadeghifard³, M. Safari⁴, F. Balavandi⁵, S. Falahi⁶, A. Kenarkoohi⁷ and H. Tavan⁸

1) Clinical Microbiology Research Centre, Ilam University of Medical Sciences, 2) Department of Biology, Faculty of Science, Ilam University, 3) Clinical Microbiology Research, Centre Ilam University of Medical Sciences, Iran, 4) Department of Radiology, School of Medicine, Emam Khomeini Hospital, 5) Department of Cardiology, School of Medicine, Shahid Mostafa Khomaeini Hospital, 6) Zoonotic Diseases Research Center, Ilam University of Medical Sciences, Ilam, Iran, 7) Department of Microbiology, Faculty of Medicine, Ilam University of Medical Sciences, Ilam, Iran and 8) Clinical Research Development Unit, Shahid Mostafa, Khomeini Hospital, Ilam University of Medical Sciences, Ilam, Iran

Abstract

The high prevalence of coronavirus disease 2019 (COVID-19) has received much attention all over the world. Nurses are in the first line of defence against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and are placed in a high-risk situation. This study aimed to report on infection with SARS-CoV-2 during patient care among nurses in the Mostafa Khomini Hospital, Ilam, Iran. In this hospital 125 nurses were enrolled in the COVID-19 centre. Five out of 125 nurses (4%) who enrolled in the COVID-19 infection centre, developed COVID-19. They were first positive by real-time PCR but the CT scan was positive for only one of them. None of the infected nurses were hospitalized and all of them preferred to quarantine at home and receive the necessary care and treatment (oseltamivir, azithromycin and lopinavir/ritonavir). This study showed that, regardless of self caring, the nurses were exposed to the virus, because at the start of the SARS-CoV-2 outbreak in Iran, there was no special protection against this infection, so the nurses were placed at risk. This study also reported that receiving the necessary care and treatment at home was a good experience for nurses and can be used in some cases.

© 2020 The Author(s). Published by Elsevier Ltd.

Keywords: Coronavirus disease 2019, Covid-19, infection, nurse, SARS-CoV-2

Original Submission: 16 April 2020; **Revised Submission:** 5 May 2020; **Accepted:** 7 May 2020

Article published online: 13 May 2020

Corresponding author. H. Tavan, Clinical Research Development Unit, Shahid Mostafa Khomeini Hospital, Ilam University of Medical Sciences, P.O. Box: 6939177143, Ilam, Iran.

E-mail: hamedtavan@gmail.com

Introduction

Coronavirus disease 2019 (COVID-19) has recently become pandemic all over the world. It has a high number of victims and their number is increasing rapidly. Transmission of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from person to person occurs primarily through direct or indirect contact through droplets spread by coughing or sneezing from

infected patients [1]. It seems that prevention is the best way of containment. People should follow the safety and health tips, including no rubbing (not physical contact between people), not touching objects, washing hands regularly, using a mask, keeping a distance from people at risk and reducing travel to crowded areas [1,2].

Diagnosis can be made using clinical signs obtained through history taking and blood tests, as well as CT scans, chest radiographs and real-time PCR as a reference standard [3,4]. The mortality rate of this disease is varies in different populations [5,6]. About 2 months after the appearance of COVID-19,

more than 82,000 cases had been diagnosed and more than 2800 deaths had been reported, most of them in China [7]. At the time of writing (14 April 2020) the statistics show that about two million people are affected and more than 120 000 deaths have been reported worldwide (<https://www.worldometers.info/coronavirus/>).

Nurses in hospitals are more at risk than people in the community because they are exposed to direct contact with infected patients. Nurses are the largest group of clinical and care providers for individuals admitted to hospitals, because they are responsible for the care and recovery of patients; so they must follow safety and health tips at work. The present study looked at five nurses who contracted COVID-19 during patient care.

Patients and methods

From February to April 2020 in the Mostafa Khomini Hospital (164 beds), 463 individuals with COVID-19 were reported and 125 nurses were involved in this centre, working a 24-hour duty shift at work followed by 72 hours off. All nurses were equipped with eye protection, mask, face shield, gloves and shoe covers. Standard sterile protocols were performed for all patients. All nurses had similar exposure levels and similar protection. Despite all of the protections, five nurses (4%) were

infected with SARS-CoV-2. Infected nurses were 33–39 years old. They were first positive by real-time PCR (TaKaRa BIO, Otsu, Shiga, Japan) and their CT scan was performed after the real-time PCR test (Fig. 1). None of them were hospitalized. They preferred to be isolated at home and to receive the necessary care and treatment there. Medication administered was oseltamivir, azithromycin and lopinavir/ritonavir

Discussion

Nurses' exposure to SARS-CoV-2 is one of the most important issues for the following reasons. SARS-CoV-2 spreads easily among people who interact with patients. Direct contact with infected people can easily transmit the virus. Despite having enough skill and knowledge, nurses in their exposures to infected patients can be affected very quickly. At the start of SARS-CoV-2 infections in Iran there was not enough protection against infection. In this case, staff of this hospital managed patients with COVID-19 in a similar way to those with routine infections. This study shows that COVID-19 can affect all people, whether they observe the safety points incompletely or do not observe them at all. Finally, COVID-19 can affect all age groups of society.

Results of CT scans showed that the nurses' lungs were incompletely involved. Their lung tissue was partially destroyed,

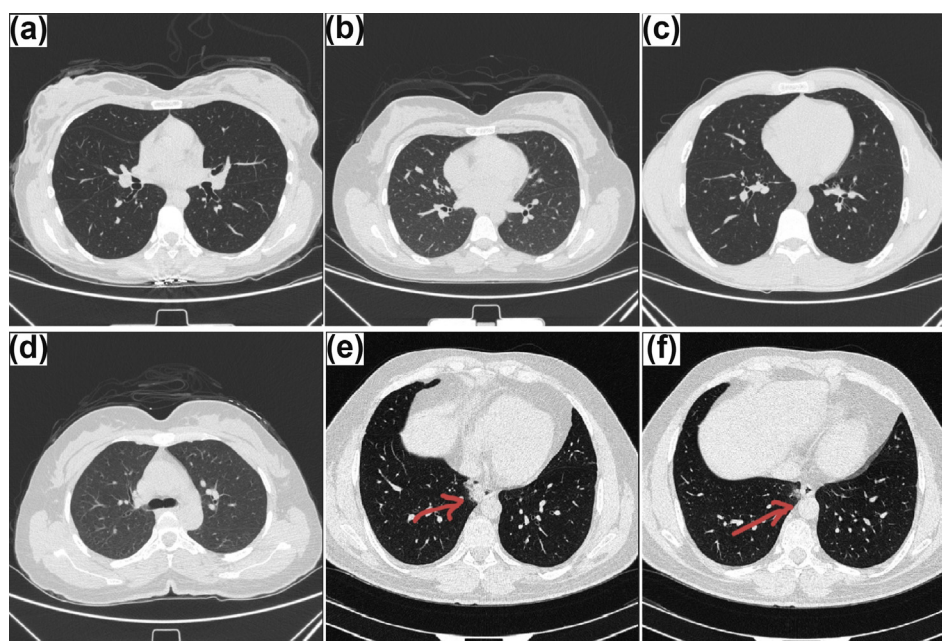


FIG. 1. The high-resolution CT scans of nurses. (a–d) Normal lung CT scans. (e, f) Both related to one nurse, show small air space consolidation with faint peripheral ground-glass infiltrates in posterobasal segment of the right lower lobe.

but Chen et al. showed that there was an extensive conflict at the level of the lungs of individuals with COVID-19 [4]. However, there was conflict between the results of our study, because only one of the five nurses had an abnormal high-resolution CT scan but all of them were positive on the real-time PCR. In our study, the real-time PCR was better for the diagnosis of SARS-CoV-2 infection. As confirmed previously, real-time PCR is accepted as a standard method of COVID-19 diagnosis. However, other serology methods were useful for confirmation and follow up of patients [8].

This study reported that receiving the necessary care and treatment at home was successfully performed. As a result of the higher incidence of COVID-19 this experience might be useful in some individuals in the future.

The present study had several limitations, the number of samples was very small. However, because of the high importance of this subject and the success of self-medication by the nurses and their quarantine at home, researchers felt that its findings were of interest. We could not obtain the results of clinical trials and their course of disease.

Conclusion

Given that nurses are affected, it can be concluded that everyone in the community is at risk for SARS-CoV-2 infection and prevention is the main strategy against this disease.

Conflict of interests

The authors declare that there is no conflict of interest.

Acknowledgements

This research is approved by Ilam University of Medical Sciences. We are grateful to the Vice-Chancellor for Research and Technology of Ilam University of Medical Sciences for financial support (Ethic number: 1399/58) and to Shahid Mostafa Khomeini Educational-Medical Centre of Ilam city for the necessary cooperation for patient information, as well as to all medical staff and nurses.

References

- [1] Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun* 2020:102433.
- [2] Wu P, Hao X, Lau EH, Wong JY, Leung KS, Wu JT, et al. Real-time tentative assessment of the epidemiological characteristics of novel coronavirus infections in Wuhan, China, as at 22 January 2020. *Euro-surveillance* 2020;25(3).
- [3] Chan JF-W, Yuan S, Kok K-H, To KK-W, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet* 2020;395(10223):514–23.
- [4] Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 2020;395(10223):507–13.
- [5] Yin Y, Wunderink RG. MERS, SARS and other coronaviruses as causes of pneumonia. *Respirology* 2018;23:130–7.
- [6] Song Z, Xu Y, Bao L, Zhang L, Yu P, Qu Y, et al. From SARS to MERS, thrusting coronaviruses into the spotlight. *Viruses* 2019;11:59.
- [7] Wilder-Smith A, Chiew CJ, Lee VJ. Can we contain the COVID-19 outbreak with the same measures as for SARS? *Lancet Infect Dis* 2020;20:e102–7.
- [8] Tang Y-W, Schmitz JE, Persing DH, Stratton CW. The laboratory diagnosis of COVID-19 infection: current issues and challenges. *J Clin Microbiol* 2020. epub ahead of print.