


Nosocomial COVID-19, a risk illustrated by the first in-hospital transmission of B.1.1.7 variant of SARS-CoV-2 in a French University Hospital

Clément Legeay¹  and Caroline Lefevre²

Journal of Infection Prevention
2022, Vol. 23(6): 293–295
© The Author(s) 2022
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/17571774221127543
jip.sagepub.com


Abstract

Objectives: In this short report, we describe the first nosocomial spread of B.1.1.7 variant (GR/20I/501Y.V1) in a French hospital, underlining the different aspects of in-hospital transmission of SARS-CoV-2.

Patients and methods: Retrospective study of a SARS-CoV-2 cluster investigation in January 2021. All cases were screened with RT-PCR.

Results: First transmission occurred in a double room with a COVID-19 imported cases, undetected upon admission. Healthcare workers, their relatives and patients' relatives were screened. Eleven secondary cases were identified within a week, in and out of the hospital (in hospital attack rate: 3.1%). No severe COVID-19 was encountered.

Conclusions: This report highlights several in-hospital chains of transmission involved with COVID-19 with rapid spread.

Keywords

Nosocomial, COVID-19, outbreak, SARS-CoV-2, infection control

Background

Since early 2020, French hospitals set up strategies to prevent in-hospital transmission of SARS-CoV-2. However, between January 2020 and January 2022, 73 414 nosocomial infections were reported to the French Public Health Agency ([Santé Publique France, 2022](https://santepubliquefrance.fr)).

SARS-CoV-2 can disseminate in hospitals through several pathways ([Abbas et al., 2021](https://doi.org/10.1186/s12874-021-01111-1)): (i) patient to patient transmission, including in multiple rooms, (ii) patient to healthcare workers (HCW), (iii) HCW to patient transmission and (iv) HCW to HCW transmission, especially during convivial moments.

In this short report, we describe the first nosocomial spread of B.1.1.7 variant (GR/20I/501Y.V1) in a French hospital, underlining the different aspects of in-hospital transmission of SARS-CoV-2.

Methods

This study takes place in January 2021 in a 1600 beds University Hospital in France (hospital A).

All patients admitted are screened for SARS-CoV-2 upon admission by nasopharyngeal swab and RT-PCR. SARS-CoV-2 RT-PCR was performed using the Aptima™ SARS-CoV-2 assay (Hologic, San Diego, USA). B.1.1.7 variant

was promptly identified using the Applied Biosystems TaqPath RT-PCR COVID-19 kit (Thermo Fisher Scientific, Waltham, USA). Samples with B.1.1.7 variant had a S-gene target failure while the two other targets were correctly amplified. Thus, S deletion H69–V70, characteristic of B.1.1.7 variant, was in the area targeted by the test. Then, these RT-PCR profiles were confirmed by partial sequencing of S gene and the results were concordant.

COVID-19 confirmed case was defined as a person screened positive for SARS-CoV-2 B.1.1.7 variant. Contact case was defined as any person in the same premises of a confirmed case at the same time. In this situation, all patients on the ward, and all healthcare workers daily working on the ward were considered contacts.

COVID-19 patients are transferred to COVID-19 dedicated wards (intensive care unit or medical unit) up to 14 or 21 days (if immunocompromised) after symptoms onset or first positive test if asymptomatic.

¹CHU Angers, Angers, France.

²Departement of virology, HIFIH Laboratory, Université d'Angers, Angers, France.

Corresponding author:

Clément Legeay, CHU Angers, 4 rue larrey, Angers 49933, France.
Email: clement.legeay@chu-angers.fr

Universal masking of all healthcare workers of the whole hospital has been in effect since April 2020. For aerosol-generating procedures, regardless of COVID-19 status of the patient, FFP2 mask, gown and eye-protection has been recommended since May 2020.

This retrospective study was approved by the Ethical Committee of Angers University Hospital.

Results

On January 11, 2021, a patient (patient A) with bronchopulmonary adenocarcinoma from a neighbouring hospital (hospital B) was admitted on the vascular surgical ward of hospital A for surgical treatment of a recurrent pneumothorax. He was tested negative for SARS-CoV-2 prior to admission on December 20, 2020 and January 09, 2021 at

hospital B. On January 16, patient A was tested positive before being transferred back to the hospital B and a B.1.1.7 variant was identified. After the alert was issued, a cluster of B.1.1.7 variant was identified on hospital B.

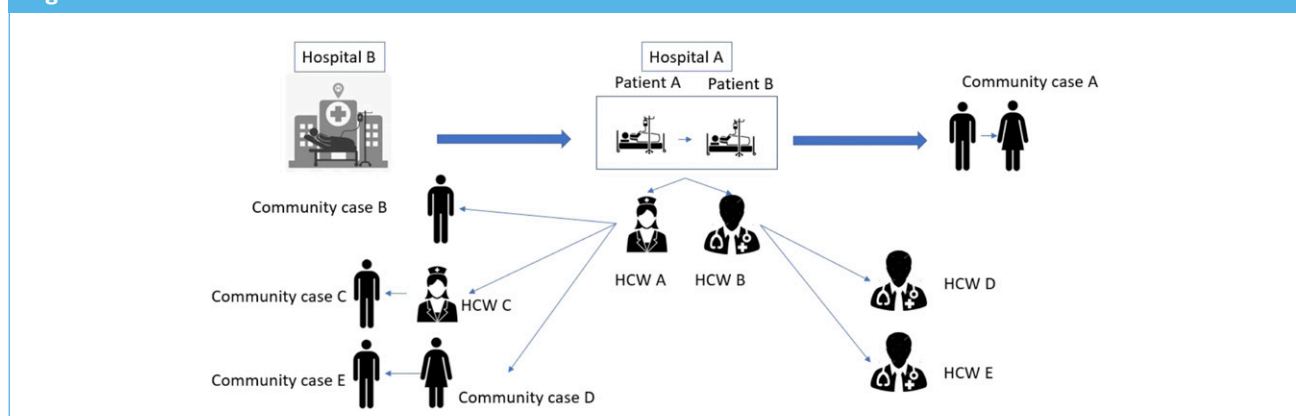
Extensive screening on the ward was promptly performed to investigate this nosocomial case: all HCWs were tested on January 20 and again on January 27. 40 HCWs (13 nurses, nine assistant nurse, eight senior doctors, seven residents and three others) were tested, two became positive, one nurse (HCW A) and one resident (HCW B).

All patients were also tested, including patients already discharged: 31 patients were contacted (1 refused screening) and 26 were still on the ward. Among them, two were room neighbours of patient A. One of them (patient B) who spent 4 days in the same room was positive and his wife too. The

Table 1. Characteristic of patients and community cases.

Case	Sexe	Age	Date of positive PCR	Severity of infection
Patient A	M	71	2021/01/16	Benign
Patient B	M	80	2021/01/21	Benign
HCW A	F	34	2021/01/21	Benign
HCW B	M	25	2021/01/20	Benign
HCW C	F	34	2021/01/22	Benign
HCW D	M	29	2021/01/21	Benign
HCW E	F	29	2021/01/21	Benign
CC-A	F	74	2021/01/22	Benign
CC-B	M	Unknown	Unknown	Benign
CC-C	M	35	2021/01/22	Benign
CC-D	F	35	2021/01/22	Benign
CC-E	M	Unknown	Unknown	Benign

Figure 1. Chain of transmission of SARS-CoV-2 infection. HCW: healthcare workers.



other one who spent 3 h in the same room was negative. All other screened patients were negative after two tests.

Tracking contacts around the two positive HCWs led to further screening outside the hospital. The husband, and two friends of HCW A (including an HCW from hospital A laboratory – HCW C), and their respective husbands were positive. Two other residents from the same housing of HCW B were tested positive (HCW D and E). No other cases were identified in the next week among respective contacts of all these cases. A summary of cases is presented in Table 1.

From January 11 to January 21, 11 cases were detected (Figure 1).

In-hospital attack rate was 3.1% among all patients and personnel exposed on the ward.

Discussion

In this report, we describe the first identified chain transmission of B.1.1.7 variant in a French University Hospital.

We highlighted that most in-hospital transmission routes were involved in this outbreak, for example, patient to patient in double room (50% of exposed), patient to HCW (5% of exposed), and HCW to HCW. We did not identify HCW to patient transmission though. Besides, nosocomial transmission lead to multiple out-hospital transmission chains. In this study, no severe COVID-19 was encountered, however, hospital-acquired COVID-19 in patients are associated with high mortality (Ponsford et al., 2021).

Staff to staff transmission, especially during break times, has already been described to be major source of infection in hospital settings (Gordon et al., 2021). However, with an early warning and distancing measures between HCW, this transmission can be mitigated.

Patient to HCW transmission occurred in two professionals despite surgical mask wearing, absence of aerosol generating procedures and hand hygiene with hydro-alcoholic products. This situation has been described before raising the question for N95 respirators or additional measures such as systematic eye protection (Klompas et al., 2021). French guidelines do not recommend N95 respirators unless aerosol generating procedure is performed (Lepelletier et al., 2020). Recent research regarding this matter did not lead to a change in recommendations. Efforts should be made regarding good practice in mask use (Picard et al., 2020), hand hygiene and other possible route of transmission (Kampf et al., 2020).

We did not perform whole genome sequencing to confirm a same source of infections in all cases. However, B.1.1.7 variant represented 3.3% of SARS-CoV-2 isolated in France early January and 13% by late January (Santé Publique France, 2021). All cases were B.1.1.7 variant confirmed and has an epidemiological link, suggesting a same source. The out-hospital attack rate could not be determined. This report raises attention to the different routes of in-hospital transmission of SARS-CoV-2 and the impact of nosocomial

transmission to further spread. A prevention policy in healthcare settings, combining non pharmaceutical measures (masks, hydro-alcoholic products, cleaning, ventilating the premises), testing (consider repeated testing in fragile populations) and a strong vaccination programme is paramount to prevent SARS-CoV-2 in-hospital spread.

In conclusion, SARS-CoV-2 poses a major challenge for infection control and prevention in healthcare settings. The multiple way of entry of the virus should be addressed and outbreaks mitigated through early detection, contact tracing and hygiene practice reinforcements.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical approval

This retrospective study was approved by the Ethical Committee.

ORCID iD

Clément Legeay  <https://orcid.org/0000-0002-7235-4348>

References

- Abbas M, Robalo Nunes T, Martischang R, et al. (2021) Nosocomial transmission and outbreaks of coronavirus disease 2019: the need to protect both patients and healthcare workers. *Antimicrobial Resistance and Infection Control* 10(1): 7.
- Gordon CL, Trubiano JA, Holmes NE, et al. (2021) Staff to staff transmission as a driver of healthcare worker infections with COVID-19. *Infection, Disease and Health* 26(4): 276–283.
- Kampf G, Brüggemann Y, Kaba HEJ, et al. (2020) Potential sources, modes of transmission and effectiveness of prevention measures against SARS-CoV-2. *Journal of Hospital Infection* 106(4): 678–697.
- Klompas M, Baker MA, Rhee C, et al. (2021) A SARS-CoV-2 cluster in an acute care hospital. *Annals of Internal Medicine* 174(6): 794–802.
- Lepelletier D, Grandbastien B, Romano-Bertrand S, et al. (2020) French society for hospital hygiene and the high council for public health what face mask for what use in the context of COVID-19 pandemic? The French guidelines. *Journal of Hospital Infection* 105(3): 414–418.
- Picard J, Cornec G, Baron R, et al. (2020) Wearing of face masks by healthcare workers during COVID-19 lockdown: what did the public observe through the French media? *Journal of Hospital Infection* 106(3): 617–620.
- Ponsford MJ, Ward TJC, Stoneham SM, et al. (2021) A systematic review and meta-analysis of inpatient mortality associated with nosocomial and community COVID-19 exposes the vulnerability of immunosuppressed adults. *Frontiers in Immunology* 12: 744696.
- Santé Publique France. (2021) *Enquêtes flash : évaluation de la circulation des variants du SARS-CoV-2 en France*. Available at: <https://www.santepubliquefrance.fr/etudes-et-enquetes/enquetes-flash-evaluation-de-la-circulation-des-variants-du-sars-cov-2-en-france> (accessed 28 October 2021).
- Santé Publique France. (2022) *Signalement d'infections à SARS-CoV-2 nosocomiales/Point au 20 janvier 2022*. <https://www.santepubliquefrance.fr/maladies-et-traumatismes/maladies-et-infections-respiratoires/infection-a-coronavirus/documents/enquetes-etudes/signalement-d-infections-a-sars-cov-2-nosocomiales.-mars-2020-janvier-2022.-point-au-20-janvier-2022> (accessed 20 February 2022).