DOI: https://doi.org/10.22267/rus.222403.283

Universidad y Salud
ORIGINAL ARTICLE

# Sars-CoV-2 infection rate in employees of a medium and high complexity hospital

Velocidad de la infección con Sars-CoV-2, en funcionarios en un hospital de mediana y alta complejidad

**Carolina Jaramillo-López**[1*] orcid.org/0000-0002-4096-6518
**Gustavo Bergonzoli**[1] orcid.org/0000-0001-9728-5239
**Felipe Tinoco-Zapata**[1] orcid.org/0000-0002-7781-776X
**Lina Montoya-Restrepo**[1,2] orcid.org/0000-0002-6198-8484

1. Grupo Gestión del Conocimiento e Innovación, Hospital Departamental Tomas Uribe Uribe de Tuluá - Empresa Social del Estado. Tuluá, Colombia.
2. Grupo de Investigación SAMESO.

Received: 22 Aug 2022 Revised: 05 Dec 2022 Accepted: 26 Dec 2022

***Citation:*** *Jaramillo-López C, Bergonzoli G, Tinoco-Zapata FJ, Montoya-Restrepo LM. Sars-CoV-2 infection rate in employees of a medium and high complexity hospital. Univ. Salud. 2022; 24(Suppl 1):279-286. DOI: https://doi.org/10.22267/rus.222403.283*

## Abstract

**Introduction:** The coronavirus disease 2019 (COVID-19) was originally identified in the city of Wuhan, China, in December 2019. Current evidence indicates that the COVID-19-causing virus is transmitted person-to-person through direct contact and droplets. **Objective:** To estimate Sars-CoV-2 virus infection rate in hospital employees according to their job responsibilities. **Materials and methods:** Retrospective cohort study to detect Sars-CoV-2 infection in hospital employees, carried out between February 2020 and October 2021. The Kaplan Meier procedure was carried out to estimate the virus infection rate based on variables such as gender, age and job description. **Results:** There was a difference in infection rate between young and older adult age groups (Log Rank=18.6 gl=1 *p*=<0.0001). A significant difference was also found between young adult and older adult groups (Log Rank=10.6 gl=1 *p*=0.0011). **Conclusions:** The older adult group showed a higher infection rate than that observed in younger age groups. These findings highlight the occupational risk of Sars-CoV-2 infection in health workers, especially in older employees. Therefore, it is necessary to maintain safety measures in order to reduce infection risks.

**Keywords:** Health care workers; Sars_CoV-2 infection; speed of infection; Kaplan-Meier procedure. (Source: DeCS, Bireme).

## Resumen

**Introducción:** La enfermedad por coronavirus 2019 se identificó originalmente en la ciudad de Wuhan, China, en diciembre de 2019. La evidencia actual indica que el virus que causa la COVID-19 se transmite de persona a persona a través del contacto directo y gotitas. **Objetivo:** Estimar la tasa de infección por el virus Sars-CoV-2 en empleados de hospitales según sus responsabilidades laborales. **Materiales y métodos:** Estudio de cohorte retrospectivo para detectar infección por Sars-CoV-2 en empleados de hospitales, realizado entre febrero 2020 y octubre 2021. Se realizó el procedimiento de Kaplan Meier para estimar la tasa de infección del virus según género, edad y descripción del trabajo. **Resultados:** Hubo una diferencia en la tasa de infección entre los grupos de edad de adultos jóvenes y mayores (Log Rank=18,6 gl=1 *p*=<0,0001). Se encontró una diferencia significativa entre grupos de adultos jóvenes y adultos mayores (Log Rank=10.6 gl=1 *p*=0.0011). **Conclusiones:** Los adultos mayores presentaron una tasa de infección superior a la observada en grupos de edades más jóvenes. Se resalta el riesgo ocupacional de infección por Sars-CoV-2 en los trabajadores de la salud, especialmente en los empleados de mayor edad. Es necesario mantener las medidas de seguridad para reducir los riesgos de infección.

**Palabras clave:** Trabajadores de la salud; infección por Sars_CoV-2; velocidad de infección; Procedimiento de Kaplan-Meier. (Source: DeCS, Bireme).

*** Corresponding Author**
Carolina Jaramillo López
e-mail: investigacion@hospitaltomasuribe.gov.co

Sars-CoV-2 infection in the patient care group was 27.6% (180/652), in the administrative group was 24.1% (46/191), and in the operational group was 17.0% (18/106). The difference between these groups was statistically significant ($Chi^2$=53.8; gl=2; $p \leq 0.0001$). Despite this significant difference, the Sars-CoV-2 infection rate did now show a statistically significant difference. The median infection was 10.0 for the three job groups (Log Rank=4; gl=2; $p$=0.12).

A study carried out on hospital workers reported a cumulative incidence of 11.2% (65/578, 95%CI 8.8-14.1)[12], which lower to that observed in this study which was 24.9% (249/1001; 95%CI 23.5-26.3). The cumulative incidence obtained in our study is higher and reaches one in four active workers.

Another study carried out in the largest hospital in New York City reported a prevalence of 13.7% of antibodies against Sars-CoV-2, which is similar to the prevalence (14%) found in a randomized study also done in New York City. However these results are higher than the prevalence reported in a study conducted in the city of Los Angeles (4.1%). A hospital in Belgium reported a 6.4% prevalence. A study carried out in Sweden on 2,149 hospital workers reported a 190% prevalence. All these figures are lower than the cumulative incidence reported in this study[13,14,15,16,17].

A study conducted in three states of the United States reported that 69.6% of 24,749 hospital employees were younger than 50 years and 78.2% were women[18]. This result is similar to our data showing that 63.6% of the study participants were women and 84.5% were younger than 56 years.

In Brazil, a study on 1,525 health workers reported a distribution of 525 medical doctors, 471 registered nurses, 263 nursing assistants, and 264 physiotherapists[19]. Although the authors found that women predominated in all categories (81.1%; 95% CI: 77.8% to 84.1%), their percentages are much higher than the ones observed in this study (63.6%; 95% CI: 59.9-67.3).

Previous evidence indicates that age and gender are important factors in the occurrence of Sars-CoV-2 virus infection. Nevertheless, this situation may be a consequence of the composition of the health labor force, particularly in developing countries where the majority of workers tend to be female.

It is noteworthy that we have not found any difference in terms of the type of work performed within our categories of patient care, administrative or operational, given that patient healthcare workers have close and lasting contact with patients. A possible explanation for this finding could be that administrative employees are in contact with patients' relatives and some of them either may be asymptomatic or are incubating the infection, but they can also transmit the virus.

Consequently, these findings highlight the occupational risk of Sars-CoV-2 infection among healthcare workers. Thus, it is important to maintain safety measures to reduce the risk of infection.

**Limitations**

The fact that this study did not assess variables such as length of time in the current job made it difficult to accomplish a more detailed analysis of the effect of time on the labor situation. Likewise, the tests carried out during the study changed from almost exclusively serological at the beginning to PCR-based techniques at the end. This change meant that not all workers were diagnosed with the same test and this could introduce a certain percentage of false negative and positive results.

**Financial support**

This work was financed by the authors

**Acknowledgments**

The authors thank all hospital workers and authorities, particularly to all people who supported this study such as colleagues from the Epidemiology area of the institution.

## References

1. World Health Organization. Health workers exposure risk assessment and management in the context of COVID-19 virus. Ginebra (CHE): WHO; 2020 Mar 4. Available from: https://apps.who.int/iris/handle/10665/331340
2. World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19–11 March 2020 [Online]. WHO; 2020 Mar 11. Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
3. CDC COVID-19 Response Team. Characteristics of Health Care Personnel with COVID-19 - United States, February 12-April 9, 2020. *MMWR Morb. Mortal. Wkly. Rep* [Online]. 2020 Apr 17; 69(15):477-81. DOI: 10.15585/mmwr.mm6915e6.
4. Mehta S, Machado F, Kwizera A, Papazian L, Moss M, Azoulay É, *et al*. COVID-19: a heavy toll on health-care workers.

*Lancet Respir. Med* [Online]. 2021 Mar 1; 9(3):226-8. DOI: 10.1016/S2213-2600(21)00068-0.
5. Soebandrio A, Kusumaningrum T, Yudhaputri FA, Oktavianthi S, Safari D, Malik SG, et al. COVID-19 prevalence among healthcare workers in Jakarta and neighbouring areas in Indonesia during early 2020 pandemic. *Ann. Med* [Online]. 2021; 53(1):1896-904. DOI: 10.1080/07853890.2021.
6. Lee ET. Statistical Methods for Survival Data Analysis. 2nd ed. New York (USA): John Wiley & Sons; 1992. DOI: 10.1002/0471458546.
7. Gouveia Oliveira A. Biostatistics Decoded. Chichester (GBR): John Wiley & Sons; 2013. DOI: 10.1002/9781118670767.
8. Le CT. Introductory Biostatistics. New Jersey (USA): John Wiley & Sons; 2003. DOI:10.1002/0471308889.
9. Schoenfeld D. Partial residuals for the proportional hazards regression model. *Biometrika* [Online]. 1982 Apr; 69(1):239-41. Available from: https://www.jstor.org/stable/2335876
10. IBM Inc. SPSS Statistics. Version 26. Available from: https://www.ibm.com/co-es/products/spss-statistics
11. SAS Institute Inc. SAS Statistical Analysis System. Version 9.4. Available from: https://www.sas.com/en_us/home.html
12. Garcia-Basteiro AL, Moncunill G, Tortajada M, Vidal M, Guinovart C, Jiménez A, *et al*. Seroprevalence of antibodies against SARS-CoV-2 among health care workers in a large Spanish reference hospital. *Nat. Commun* [Online]. 2020 Jul 8; 11(1):3500. DOI: 10.1038/s41467-020-17318-x.
13. Moscola J, Sembajwe G, Jarrett M, Farber B, Chang T, McGinn T, *et al*. Prevalence of SARS-CoV-2 Antibodies in Health Care Personnel in the New York City Area. *JAMA* [Online]. 2020 Sep 1; 324(9):893-5. DOI: 10.1001/jama.2020.14765.
14. Arentz M, Yim E, Klaff L, Lokhandwala S, Riedo FX, Chong M, *et al*. Characteristics and Outcomes of 21 Critically Ill Patients With COVID-19 in Washington State. *JAMA* [Online]. 2020 Apr 28; 323(16):1612-4. DOI: 10.1001/jama.2020.4326.
15. Sood N, Simon P, Ebner P, Eichner D, Reynolds J, Bendavid E, *et al*. Seroprevalence of SARS-CoV-2-Specific Antibodies Among Adults in Los Angeles County, California, on April 10-11, 2020. *JAMA* [Online]. 2020 Jun 16; 323(23):2425-7. DOI: 10.1001/jama.2020.8279.
16. Steensels D, Oris E, Coninx L, Nuyens D, Delforge M-L, Vermeersch P, *et al*. Hospital-Wide SARS-CoV-2 Antibody Screening in 3056 Staff in a Tertiary Center in Belgium. *JAMA* [Online]. 2020 Jul 15; 324(2):195-7. DOI: 10.1001/jama.2020.11160.
17. Rudberg A-S, Havervall S, Månberg A, Jernbom Falk A, Aguilera K, Ng H, *et al*. SARS-CoV-2 exposure, symptoms and seroprevalence in healthcare workers in Sweden. *Nat. Commun* [Online]. 2020 Oct 8; 11(1):5064. DOI: 10.1038/s41467-020-18848-0.
18. Jacob JT, Baker JM, Fridkin SK, Lopman BA, Steinberg JP, Christenson RH, *et al*. Risk Factors Associated With SARS-CoV-2 Seropositivity Among US Health Care Personnel. *JAMA Netw. Open* [Online]. 2021 Mar 1; 4(3):e211283. DOI: 10.1001/jamanetworkopen.2021.1283.
19. Albuquerque MFPM, de Souza WV, Montarroyos UR, Pereira CR, Braga C, Barreto de Araújo TV, *et al*. Risk of SARS-CoV-2 infection among front-line healthcare workers in Northeast Brazil: a respondent-driven sampling approach. *BMJ Open* [Online]. 2022 Jun 6; 12(6):e058369. DOI: 10.1136/bmjopen-2021-058369.