6. Variants_of_Concern_VOC_Technical_Briefing_6_England-1.pdf [Internet]. [citado 6 de junio de 2021]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/961299/Variants_of_Concern_VOC_Technical_Briefing_6_England-1.pdf.
7. Alessandrini F, Caucci S, Onofri V, Melchionda F, Tagliabracci A, Bagnarelli P, et al. Evaluation of the Ion AmpliSeq SARS-CoV-2 research panel by massive parallel sequencing. Genes (Basel). 2020;11:929, http://dx.doi.org/10.3390/genes11080929.
8. Shepard SS, Meno S, Bahl J, Wilson MM, Barnes J, Neuhaus E. Viral deep sequencing needs an adaptive approach: IRMA, the iterative refinement meta-assembler. BMC Genomics. 2016;17:708, http://dx.doi.org/10.1186/s12864-016-3030-6.
9. Robinson J, Thorvaldsdóttir H, Winckler W, Guttman M, Lander ES, Getz G, et al. Integrative genomics viewer. Nat Biotechnol. 2011;29:24–6, http://dx.doi.org/10.1038/nbt.1754.
10. Hadfield J, Megill C, Bell SM, Huddleston J, Potter B, Callender C, et al. Nextstrain: real-time tracking of pathogen evolution. Bioinformatics. 2018;34:4121–3, http://dx.doi.org/10.1093/bioinformatics/bty407.

Mikel Urrutikoetxea-Gutierrez[a,c,*], Estibaliz Ugalde Zarraga[a,c], Mikel Gallego Rodrigo[b,c], Jose Luis Díaz de Tuesta del Arco[a,c]

[a] *Hospital Universitario Basurto, Servicio de Microbiología Clínica, Bizkaia, Spain*
[b] *Hospital Universitario Cruces, Servicio de Microbiología Clínica, Bizkaia, Spain*
[c] *Grupo de Microbiología y Control Infección, Instituto Biocruces Bizkaia, Bizkaia, Spain*

* Corresponding author.
E-mail address: mikel.j.urruti@gmail.com
(M. Urrutikoetxea-Gutierrez).

https://doi.org/10.1016/j.eimce.2022.06.005
2529-993X/

Could the stethoscope be a SARS-CoV-2 vector?

¿Podría ser el fonendoscopio un vector del SARS-CoV-2?

Dear Editor,

SARS-CoV-2 is a viral disease that is transmitted by different mechanisms, among which are aerosols and fomites. The stethoscope is a medical device that is used for different patients, which is known for its ability to transmit other infectious diseases between patients and healthcare workers.[1,2] Usually, the stethoscope is placed on the front and back of the chest, while the patient breathes or even coughs on it. Despite the exponential growth of knowledge about the infection by SARS-CoV-2, to date, no study has been published that analyzes the possibility that the stethoscope acts as a fomite in the transmission of SARS-CoV-2. We conducted the present study to assess the ability of transmitting SARS-CoV-2 through the stethoscope.

In our hospital, a clean stethoscope was placed in each isolation room with symptomatic patients with pneumonia due to SARS-CoV-2. During the months of January and February 2021, we studied the presence of SARS-CoV-2 in 100 stethoscopes from specific SARS-CoV-2 rooms. Two hours after conducting the respiratory assessment, samples for PCR detection of SARS-CoV-2 RNA were taken using a swab with a synthetic tip and a plastic shaft rubbing the diaphragm for 10 s. A real-time Seegene PCR that detected 3 specific genes (RdRP, E and N) was used. The stethoscopes were not disinfected since the first day of admission of the patients. Fifty-four of them were in single rooms, and the remaining in double rooms. The patients admitted to these rooms had a median hospital stay prior to inclusion in the study of 7 days (3–12). The presence of SARS-CoV-2 was confirmed with nasopharyngeal swabs on the day of admission. PCR was used in 75 of the cases, with a mean cycle threshold (Ct) of 26 ± 5.1. The remaining 71 were confirmed by antigen detection by chemiluminescence, which could be a limitation of the study. SARS-CoV-2 RNA was not detected in any of the samples obtained from the stethoscopes.

Despite the importance of standard precautions, such as environmental cleaning and hand hygiene, which prevent the transmission of other microorganisms, the demonstration that a single route of transmission is capable of transmitting SARS-CoV-2 in real situations is very complex. The most studied and known SARS-CoV-2 transmission mechanism is produced by drops, caused by direct, indirect or close contact with infected people through the contaminated secretions expelled during speech (5–10 μm). Airborne transmission caused by the suspension of aerosols in the air for long periods, especially in closed environments with poor ventilation (<5 μm), has also been stablished.[3] The last studied mechanism, transmission by fomites, is caused by respiratory secretions deposited on different surfaces and objects, which can be maintained for long periods (from hours to days), depending on the type of surface, especially in hospital environments. This fact has motivated the performance of various studies that consider the possibility of this route of transmission plausible, especially in rooms of patients infected by SARS-CoV-2. The virus is more stable in plastic and steel (stethoscope materials) than in copper and cardboard, and viable virus remains can be detected up to 72 h later, with stability kinetics like SARS-CoV-1.[4] Environmental contamination has been described in rooms with symptomatic patients with SARS-CoV-2 infection, being more frequent on the floor and bed rail, associated with a lower cycle threshold and during the first week of admission. This is probably due to direct contamination by either the patient or by healthcare workers after contacting with infected respiratory fluids.[5] There are controversial studies that describe the presence of SARS-CoV-2 RNA in the hospital environment, but none of them has shown it as the cause of an outbreak.[6,7] Our study revealed that, despite including symptomatic patients with low Ct, the presence of SARS-CoV-2 on stethoscopes was not found.

In conclusion, the stethoscope as a medical tool that is in contact with the patient is not a fomite capable of transmitting SARS-CoV-2 but this fact does not mean that systematic cleaning should not be performed.

Funding

The PCR reagents used were provided by Werfen Werfen (Spain).

Conflicts of interest

None to declare.

References

1. Vasudevan RS, Horiuchi Y, Torriani FJ, Cotter B, Maisel SM, Dadwal SS, et al. Persistent value of the stethoscope in the age of COVID-19. Am J Med. 2020;133:1143–50, http://dx.doi.org/10.1016/j.amjmed.2020.05.018.
2. O'Flaherty N, Fenelon L. The stethoscope and healthcare-associated infection: a snake in the grass or innocent bystander? J Hosp Infect. 2015;91:1–7, http://dx.doi.org/10.1016/j.jhin.2015.04.010.

3. World Health Organization. Infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care [Internet]. Geneva, Switzerland: World Health Organization; 2014. Available from: https://apps.who.int/iris/bitstream/handle/10665/112656/9789241507134_eng.pdf?sequence=1 [accessed 7.6.21].
4. Van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med. 2020;382:1564–7, http://dx.doi.org/10.1056/NEJMc2004973.
5. Chia PY, Coleman KK, Tan YK, Ong SWX, Gum M, Lau SK, et al. Detection of air and surface contamination by SARS-CoV-2 in hospital rooms of infected patients. Nat Commun. 2020;11:2800, http://dx.doi.org/10.1038/s41467-020-16670-2.
6. Moore G, Rickard H, Stevenson D, Aranega-Bou P, Pitman J, Crook A, et al. Detection of SARS-CoV-2 within the healthcare environment: a multi-centre study conducted during the first wave of the COVID-19 outbreak in England. J Hosp Infect. 2021;108:189–96, http://dx.doi.org/10.1016/j.jhin.2020.11.024.
7. Colaneri M, Seminari E, Piralla A. Lack of SARS-CoV-2 RNA environmental contamination in a tertiary referral hospital for infectious diseases in Northern Italy. J Hosp Infect. 2020;105:474–6, http://dx.doi.org/10.1016/j.jhin.2020.03.018.

Ramón Baeza-Trinidad [a,*], Ana Yasmina Brito-Diaz [a], Jose Daniel Mosquera-Lozano [a], Jose Manuel Azcona-Gutierrez [b]
[a] *Internal Medicine Department, Hospital San Pedro, Logroño, Spain*
[b] *Microbiology Department, Hospital San Pedro, Logroño, Spain*

* Corresponding author.
E-mail address: ramonbaezat@yahoo.es (R. Baeza-Trinidad).

https://doi.org/10.1016/j.eimc.2021.07.012

Evaluation of the detection of specific IgM against measles virus by the chemiluminescence immunoassay Liaison® Measles IgM☆

Evaluación de la detección de IgM específica frente a sarampión mediante el ensayo de inmunoquimioluminiscencia (CLIA) Liaison® Measles IgM

The Measles Surveillance Protocol[1] establishes that suspicions must be studied by means of confirmation tests for case classification. The results must be available, if possible, within 24 h.[1] According to the WHO, the reference method is the detection of specific IgM. However, molecular diagnosis is becoming increasingly important.[2] In Spain, different serological methods have been used.[3] In this study, the performance of the LIAISON® Measles IgM chemiluminescence immunoassay (CLIA) (DiaSorin, Saluggia, Italy) technique was evaluated against the Enzygnost®Anti-Measles Virus IgM ELISA method (Siemens Healthcare Diagnostics, Marburg, Germany).

Fifty (50) serum samples were studied for the detection of IgM against measles virus by CLIA. These samples corresponded to confirmed cases of measles (n = 20) or mumps (n = 30) and were selected based on previous IgM results for either of these viruses by Enzygnost® Anti-Measles Virus (IgM) or Enzygnost® Anti-Mumps Virus (IgM) ELISA methods. For 17 of these suspected measles samples, RT-PCR data were available[4,5] in pharyngeal exudate samples for detection of measles virus RNA, and in 29 of these suspected mumps samples, RT-PCR results[6] in saliva were available for detection of mumps virus RNA.

The distribution of results by CLIA compared to those obtained by ELISA is shown in Table 1. In 19 of the 20 cases in which the detection of IgM against measles virus had been positive by ELISA, the CLIA results were also positive (95.0% sensitivity; 95% CI 75.1–99.9). These data were supported by the fact that RT-PCR results for measles virus were available in 16 paired pharyngeal exudate samples, and virus RNA was identified in all of them. The case that was measles IgM negative by CLIA and positive by ELISA corresponded to a patient in whom the RT-PCR in the pharyngeal exudate had also been positive for the virus. This patient was a 52-year-old adult who had been vaccinated 14 days prior to rash onset and sample collection (obtained on the first day of rash) and who also had a negative IgG result by ELISA (Enzygnost® Measles IgG). The IgM against measles result obtained with CLIA was negative in the 30 cases with a prior positive IgM against mumps result by ELISA (100% specificity; 95% CI 88.4–100). This specificity was supported by the fact that in 28 of the 30 CLIA-measles IgM negative cases, there were RT-PCR results in saliva for mumps virus, and in 24 (85.7%) of them, virus RNA was detected.

The results of this study suggest good levels of sensitivity and specificity for LIAISON® Measles for the detection of measles IgM. In previous studies, the detection of measles IgM using this assay has also shown excellent levels of diagnostic performance (sensitivity of 92–98.8% and specificity of 96.6–100%[7–10]). One of the limitations of this study lies in the small number of samples included. Another is that the control group to establish the level of specificity did not refer to samples confirmed as measles IgM negative, but to mumps IgM positive samples. However, this fact could represent a guarantee of no IgM cross-reactivity between both paramyxoviruses. In the only measles IgM negative case by CLIA, but positive by ELISA, and vaccinated two weeks prior, obtaining the sample very early could have favoured the appearance of this result. In recently immunised patients, cases may arise, with mild clinical manifestations, associated with weak or negative IgM serological responses.

In conclusion, these results support the usefulness of LIAISON® Measles for the detection of measles IgM. Among the potential advantages of this technique, it is worth mentioning the minimal handling of sera, its high level of automation and ease of use, as well as random and continuous access to samples. These characteristics

Table 1
Measles IgM results by LIAISON® Measles assay in serum samples corresponding to patients with clinical suspicion of measles or mumps and previously processed with Enzygnost® Measles or Enzygnost® Mumps.

	Enzygnost® Measles IgM+	Enzygnost® Mumps IgM+	Total
LIAISON® Measles IgM+	19[a]	0	19
LIAISON® Measles IgM−	1[b]	30[c]	31
Total	20	30	50

Sensitivity of CLIA compared to ELISA of 95.0% (95% CI 75.1–99.9). Specificity of CLIA compared to ELISA of 100% (95% CI 88.4–100).

[a] Of the 19 measles IgM LIAISON® IgM+ and Enzygnost® IgM+ cases, 16 had undergone measles PCR and all were positive.

[b] The measles IgM LIAISON® IgM− and Enzygnost® IgM+ case was a 50-year-old adult with a positive PCR result for measles who had been vaccinated 14 days before the onset of the rash and the sampling.

[c] Of the 30 measles LIAISON® IgM− and mumps Enzygnost IgM+ cases, 28 had undergone PCR for mumps, and 24 of them were positive and 4 negative.

☆ Please cite this article as: Sanz JC, Ramos B, Pérez-Olmeda M, Fernández-García A, Evaluación de la detección de IgM específica frente a sarampión mediante el ensayo de inmunoquimioluminiscencia Liaison® Measles IgM, Enferm Infecc Microbiol Clin. 2022;40:523–524.