

LETTER TO THE EDITOR

Safety considerations for the use of Point-Of-Care diagnostics during SARS-CoV-2 pandemic

To the Editor,

Since the outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in December 2019 in China, the number of infections has increased causing a worldwide pandemic. On 23 August 2020, over 31 million cases worldwide have been recorded by the Johns Hopkins University.¹

With an increasing rate of infections, a growing number of patients with associated coagulopathies have been reported. Of note, findings of a disseminated intravascular coagulopathy (DIC) in the early phase of the infection with substantially increased D-dimers have been observed.^{2,3} Some studies suggest that the respiratory infection itself and different ventilation modes lead to inflammatory pulmonary micro-thrombus formation.^{4,5}

Thus, a highly differentiated coagulation diagnostic in patients with SARS-CoV-2 infection should become the focus of current treatment strategies. In order to obtain quick results of patients on the intensive care unit (ICU), point-of-care testing (POCT) for rotational thrombelastometry/-graphy and platelet function is of great importance. Therefore, POCT analyses should also be used during the SARS-CoV-2 pandemic.⁶⁻¹⁰

For POCT analysis, healthcare personnel are handling with potentially infectious blood samples.¹¹ The SARS-CoV-2 virus may be transmitted while pipetting blood samples, and aerosol formation may be supported by heating of blood samples and the magnetic stirrer, rotating pin/axis, or rotating tubes. These potential sources of infection lead to major concerns regarding infection control for medical staff dealing with SARS-CoV-2-infected patients.

In order to minimize the risk of infection for POCT users, POCT analyzers with closed containers may represent a suitable option. However, re-opening or disposing of containers could cause another possible source of virus transmission.¹²

Therefore, POCT analyzers using an automated cartridge system should be considered. The use of cartridges ensures to keep the blood samples sealed. However, some flexible components of these cartridge systems may get in direct contact with blood samples, which poses a potential risk of infection. Devices using sonometry enable analysis without direct contact of the sample to movable parts of the device and thus may offer a special feature in this regard.

In light of the SARS-CoV-2 pandemic, the use of coagulation diagnostics and POCT analysis has gained increasing attention. However, analyzers entail a risk of virus transmission and infection of healthcare personnel. Thus, POCT devices based on cartridge system may be beneficial in reducing the potential risk of virus transmission and minimizing the risk of infection. In case of availability of different POCT devices, it should be considered to keep the one based on cassette structure on the isolation ward. Therefore, we designed a flowchart (Figure 1) for possible management of potential infectious probes depending on the availability of one or more POCT devices. The algorithm presented by us is not only intended for the COVID-19 pandemic but may also be used in the setting of other infectious diseases/pandemics.

ACKNOWLEDGMENT

Open access funding enabled and organized by ProjektDEAL.

CONFLICT OF INTEREST

FP, EA., and VN declare to have no conflict of interest. FR: received funding and speaker honoraria from Boehringer Ingelheim, pharmaceutical Petersohn, HemoSonics, Publikationsfond Uni Frankfurt, Keller Medical GmbH, and HELIOS Klinikum. KZ department is receiving unrestricted educational grants from B. Braun Melsungen AG, Fresenius Kabi GmbH, CSL Behring GmbH, and Vifor Pharma GmbH. In the past 3 years, KZ has received honoraria or travel support for consulting or lecturing from the following companies: Abbott GmbH & Co KG, Aesculap Akademie GmbH, AQAI GmbH, Astellas Pharma GmbH, Astra Zeneca GmbH, Aventis Pharma GmbH, B. Braun Melsungen AG, Baxter Deutschland GmbH, Biosyn GmbH, Biotest AG, Bristol-Myers Squibb GmbH, CSL Behring GmbH, Dr F. Köhler Chemie GmbH, Dräger Medical GmbH, Essex Pharma GmbH, Fresenius Kabi GmbH, Fresenius Medical Care, Gambro Hospital GmbH, Gilead, GlaxoSmithKline GmbH, Grünenthal GmbH, Hamilton Medical AG, HCCM Consulting GmbH, Heinen + Löwenstein GmbH, Janssen-Cilag GmbH, med Update GmbH, Medivance EU BV, MSD Sharp & Dohme GmbH, Novartis Pharma GmbH, Novo Nordisk Pharma GmbH, P. J. Dahlhausen & Co. GmbH, Pfizer Pharma GmbH, Pulsion Medical Systems SE, Siemens Healthcare, Teflex Medical GmbH, Teva GmbH, TopMedMedizintechnik GmbH, Verathon Medical, ViforPharma GmbH.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2020 The Authors. *Journal of Clinical Laboratory Analysis* Published by Wiley Periodicals LLC

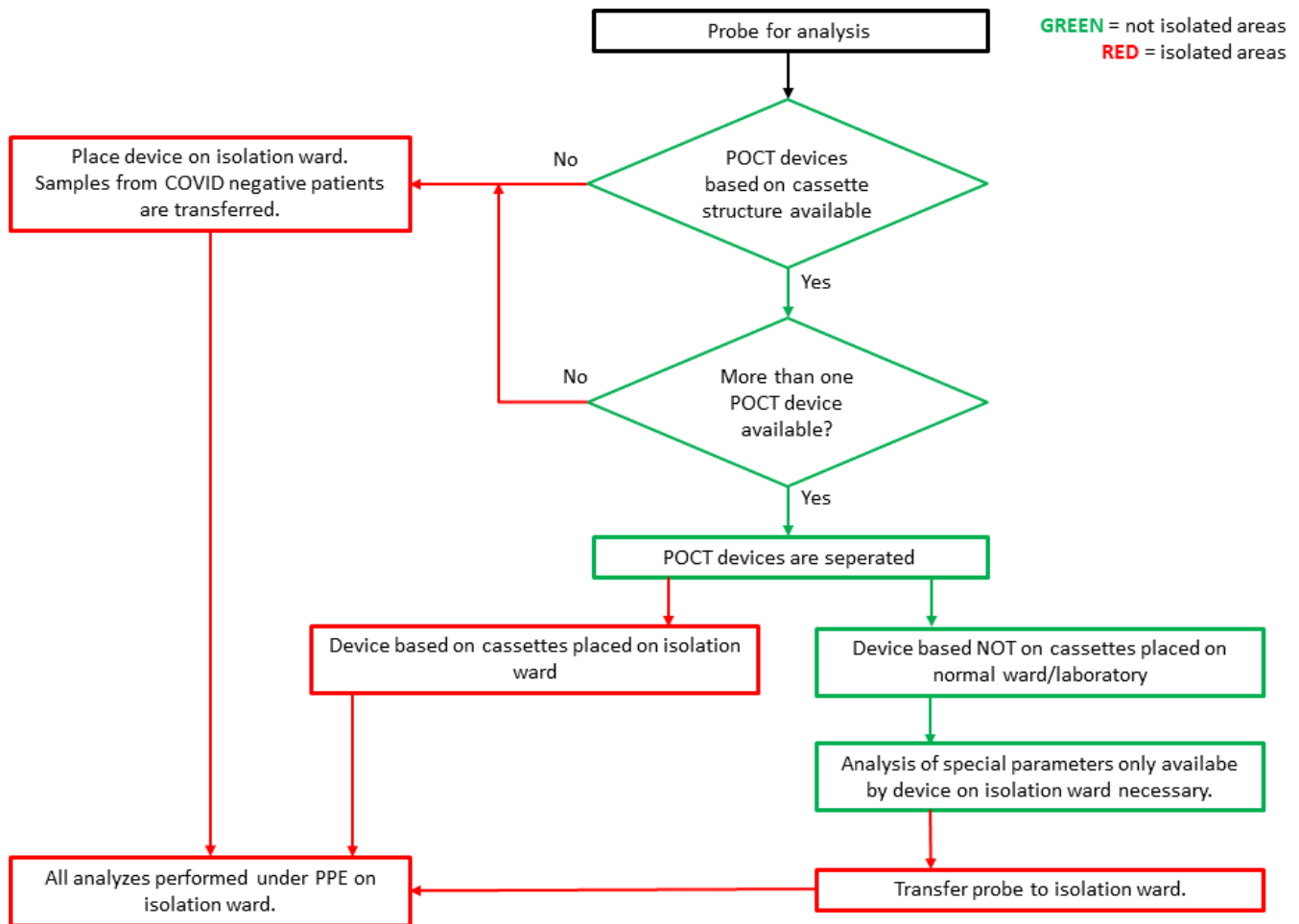


FIGURE 1 Flowchart. Green: not isolated areas; red: isolated areas; POCT, point-of-care testing; PPE, personal protective equipment

Florian J. Raimann

Florian Piekarski
Elisabeth H. Adam
Kai Zacharowski
Vanessa Neef

Department of Anesthesiology, Intensive Care Medicine and Pain Therapy, University Hospital Frankfurt, Goethe University, Frankfurt, Germany

Correspondence

Florian J. Raimann, Department of Anaesthesiology, Intensive Care Medicine and Pain Therapy, University Hospital Frankfurt, Theodor-Stern Kai 7, 60590 Frankfurt, Germany.
Email: Florian.Raimann@kgu.de

ORCID

Florian J. Raimann <https://orcid.org/0000-0002-6597-9585>

REFERENCES

1. Johns Hopkins University. COVID. <https://coronavirus.jhu.edu/map.html>. Accessed on September 21, 2020.
2. Connors JM, Levy JH. COVID-19 and its implications for thrombosis and anticoagulation. *Blood*. 2020;135(23):2033-2040. <https://doi.org/10.1182/blood.2020006000>
3. Llitjos JF, Leclerc M, Chochois C, et al. High incidence of venous thromboembolic events in anticoagulated severe COVID-19 patients. *J Thromb Haemost*. 2020;18(7):1743-1746. <https://doi.org/10.1111/jth.14869>
4. Dolhnikoff M, Duarte-Neto AN, de Almeida Monteiro RA, et al. Pathological evidence of pulmonary thrombotic phenomena in severe COVID-19. *J Thromb Haemost*. 2020;18(6):1517-1519. <https://doi.org/10.1111/jth.14844>
5. Gattinoni L, Chiumello D, Caironi P, et al. COVID-19 pneumonia: different respiratory treatments for different phenotypes? *Intensive Care Med*. 2020;14:1-4.
6. Panigada M, Bottino N, Tagliabue P, et al. Hypercoagulability of COVID-19 patients in Intensive Care Unit. A report of thromboelastography findings and other parameters of hemostasis. *J Thromb Haemost*. 2020;18(7):1738-1742. <https://doi.org/10.1111/jth.14850>
7. Wright FL, Vogler TO, Moore EE, et al. Fibrinolysis shutdown correlates to thromboembolic events in severe COVID-19 infection. *J*

- Am Coll Surg.* 2020;231(2):193-203.e1. <https://doi.org/10.1016/j.jamcollsurg.2020.05.007>
8. Pavoni V, Gianesello L, Pazzi M, Stera C, Meconi T, Frigieri FC. Evaluation of coagulation function by rotation thromboelastometry in critically ill patients with severe COVID-19 pneumonia. *J Thromb Thrombolysis.* 2020;50(2):281-286. <https://doi.org/10.1007/s11239-020-02130-7>
 9. Ranucci M, Ballotta A, Di Dedda U, et al. The procoagulant pattern of patients with COVID-19 acute respiratory distress syndrome. *J Thromb Haemost.* 2020;18(7):1747-1751. <https://doi.org/10.1111/jth.14854>
 10. Raval JS, Burnett AE, Rollins-Raval MA, et al. Viscoelastic testing in COVID-19: a possible screening tool for severe disease?. *Transfusion.* 2020;60(6):1131-1132. <https://doi.org/10.1111/trf.15847>
 11. Leblanc J-F, Germain M, Delage G, O'Brien S, Drews SJ, Lewin A. Risk of transmission of severe acute respiratory syndrome coronavirus 2 by transfusion: a literature review. *Transfusion.* 2020. <https://doi.org/10.1111/trf.16056>. [Epub ahead of print].
 12. National Research Council (US) Committee on Hazardous Biological Substances in the Laboratory. *Biosafety in the laboratory: prudent practices for the handling and disposal of infectious materials.* Washington, DC: National Academies Press (US); 1989. 3, Safe Handling of Infectious Agents. Available from <https://www.ncbi.nlm.nih.gov/books/NBK218635/>

How to cite this article: Raimann FJ, Piekarski F, Adam EH, Zacharowski K, Neef V. Safety considerations for the use of Point-Of-Care diagnostics during SARS-CoV-2 pandemic. *J Clin Lab Anal.* 2021;35:e23631. <https://doi.org/10.1002/jcla.23631>