

## **Maintenance of Acute Stroke Care Service during the COVID-19 pandemic lockdown**

Valerian L Altersberger, MD<sup>1</sup>, Lotte J Stolze, MD<sup>2</sup>; Mirjam R Heldner, MD<sup>3</sup>, Hilde Henon, MD<sup>4</sup>; Nicolas Martinez-Majander, MD<sup>5</sup>; Christian Hametner, MD<sup>6</sup>; Annika Nordanstig, MD, PhD<sup>7</sup>; Andrea Zini, MD<sup>8</sup>; Stefania Nannoni, MD<sup>9</sup>; Bruno Gonçalves, MD<sup>10,11</sup>; Christian H Nolte, MD<sup>12</sup>; Philipp Baumgartner, MD<sup>13</sup>; Andreas Kastrup, MD<sup>14</sup>; Panagiotis Papanagiotou, MD<sup>14</sup>; Georg Kägi, MD<sup>15</sup>; Ronen R Leker, MD<sup>16</sup>; Marialuisa Zedde, MD<sup>17</sup>; Alessandro Padovani, PhD<sup>18</sup>; Alessandro Pezzini, MD<sup>18</sup>; Visnja Padjen, PhD<sup>19</sup>; Carlo W Cereda, MD<sup>20</sup>; Georges Ntaios, PhD<sup>21</sup>; Leo H Bonati, MD<sup>1</sup>; Leon A Rinkel, MD<sup>2</sup>; Urs Fischer, MD<sup>3</sup>; Jan F Scheitz, MD<sup>12</sup>; Susanne Wegener, MD<sup>13</sup>; Guillaume Turc, PhD<sup>10</sup>; Patrik Michel, MD<sup>9</sup>; Mauro Gentile, MD<sup>8</sup>; Alexandros Rentzos, PhD<sup>7,22</sup>; Peter A Ringleb, MD<sup>6</sup>; Sami Curtze, PhD<sup>5</sup>; Charlotte Cordonnier, PhD<sup>4</sup>; Marcel Arnold, MD<sup>3</sup>; Paul J Nederkoorn, PhD<sup>2\*</sup>; Stefan T Engelter, MD<sup>1,23\*</sup>, Henrik Gensicke, MD<sup>1,23\*</sup>, on behalf of the Thrombolysis in Stroke Patients (TRISP) collaborators

\* contributed equally

### **Affiliations:**

1. Stroke Center and Department of Neurology, University Hospital Basel and University of Basel, Switzerland
2. Department of Neurology, Amsterdam UMC, University of Amsterdam, Amsterdam, the Netherlands
3. Department of Neurology, Inselspital, Bern University Hospital and University of Bern, Switzerland
4. University Lille, Inserm, CHU Lille, U1172- F-59000 Lille, France
5. Neurology, University of Helsinki and Helsinki University Hospital, Finland
6. Department of Neurology, University Hospital Heidelberg, Germany

7. Department of Clinical Neuroscience, Institute of Neuroscience and Physiology, Sahlgrenska Academy at University of Gothenburg; Department of Neurology, Sahlgrenska University Hospital, Gothenburg, Sweden
8. IRCCS Istituto delle Scienze Neurologiche di Bologna, Department of Neurology and Stroke Center, Maggiore Hospital, Bologna, Italy
9. Department of Neurology, Centre Hospitalier Universitaire Vaudois and University of Lausanne, Switzerland
10. Department of Neurology, Sainte-Anne Hospital, Paris, France Université Paris Descartes, Paris, France
11. Niteroi D'Or Hospital, Niteroi, Brazil
12. Klinik Neurologie mit Experimenteller Neurologie, Charité-Universitätsmedizin Berlin, corporate member of Freie Universität Berlin, Humboldt-Universität zu Berlin, Berlin Institute of Health, Germany and Center for Stroke Research Berlin (CSB), Charité-Universitätsmedizin Berlin, Germany
13. Zurich Department of Neurology, University Hospital Zurich and University of Zurich, Switzerland
14. Departments of Neurology and Neuroradiology, Klinikum Bremen-Mitte, Bremen, Germany.
15. Department of Neurology, Kantonsspital St. Gallen, Switzerland
16. Department of Neurology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel
17. Neurology Unit, Neuromotor & Rehabilitation Department, Azienda USL-IRCCS di Reggio Emilia, Reggio Emilia, Italy.
18. Neurology Section, Department of Clinical and Experimental Sciences, University of Brescia; Neurology Unit, ASST Spedali Civili, Italy
19. Neurology Clinic, Clinical Centre of Serbia, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

20. Stroke Center and department of Neurology, Neurocenter of Southern Switzerland, Lugano, Switzerland
21. Department of Internal Medicine, Faculty of Medicine, School of Health Sciences, University of Thessaly, Larissa, Greece
22. Diagnostic and Interventional Neuroradiology, Sahlgrenska University Hospital and Department of Radiology, Institute of clinical sciences, Sahlgrenska Academy, University of Gothenburg, Sweden
23. Neurology and Neurorehabilitation, University Department of Geriatric Medicine FELIX PLATTER, University of Basel, Basel Switzerland

## **Abstract**

**Background and Purpose:** Timely reperfusion is an important goal in treatment of eligible acute ischemic stroke patients. However, during the Corona Virus Disease 2019 (COVID-19) pandemic pre- and in-hospital emergency procedures faced unprecedented challenges, which might have caused a decline in the number of acute reperfusion therapy applied and led to a worsening of key quality measures for this treatment during lockdown.

**Methods:** This prospective multicenter cohort study used data from the Thrombolysis in Ischaemic Stroke Patients (TRISP) registry of acute ischemic stroke patients treated with reperfusion therapies, i.e. intravenous thrombolysis (IVT) and/or endovascular therapy (EVT). We compared pre- and in-hospital time-based performance measures (stroke-onset-to-admission, admission-to-treatment, admission-to-image and image-to-treatment time) during the first six weeks after announcement of lockdown (lockdown period) with the same period in 2019 (reference period). Secondary outcomes included stroke severity (NIHSS) after 24 hours and occurrence of symptomatic intracranial hemorrhage (sICH; following the ECASS-II-criteria).

**Results:** Across 20 stroke centers, 540 patients were treated with IVT/EVT during lockdown period compared to 578 patients during reference period (-7% [95%CI: 5-9%]). Performance measures did not change significantly during the lockdown period (2020/2019 minutes median: onset-to-admission 133/145; admission-to-treatment 51/48). Same was true for admission-to-image (20/19) and image-to-treatment (31/30) time in patients with available time of first image (n=871, 77.9%). Median NIHSS on admission (2020/2019: 11/11) and after 24 hours (2020/2019: 6/5), and percentage of sICH (2020/2019: 6.2/5.7) did not differ significantly between both periods.

**Conclusions:** The COVID-19 pandemic lockdown resulted in a mild decline in the number of stroke patients treated with acute reperfusion therapies. More importantly, the solid stability of key quality performance measures between the 2020 and 2019 period may indicate resilience

of acute stroke care service during the lockdown, at least in well-established European stroke centers.