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Castelli E, Fazzi E; SIMFER-SINPIA Intersociety Commission. Recommendations for the rehabilitation of children with cerebral palsy. *Eur J Phys Rehabil Med* 2016;52:691-703.

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Techniques in the Diagnosis and Staging of Hidradenitis Suppurativa. *G Ital Dermatol Venereol* 2018;153 (3 Suppl 2), 20-5.

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- Congress proceedings

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During disease outbreaks community anxiety tends to rise and this is certainly amplified by the confinement measures³ actually implemented across the majority of European countries. Moreover a robust association has been found between psychological stress and aneurysm rupture risk.⁴ The potential mechanisms behind the association between perceived stress and an increased risk of SAH are complex and not fully understood. Possible mechanisms relate to overstimulation of the hypothalamus-pituitary-adrenal axis and increased release of cortisol. In addition, psychosocial stress is also associated with endothelial dysfunction. Several trigger factors have been identified for intracranial aneurysms, including a sudden increase in blood pressure, which may be stress induced.¹ The precipitated factors should probably explain an increase and not a dramatic decrease of SAH as we are now actually observing during our clinical practice. Possible explanations to such "strange" epidemiological situation are: 1) decrease of people seeking for medical help fearing to get infected; 2) excessive pressure on healthcare system that may lead to misdiagnosis especially for patients presenting headache which can be, along altered mental status, also one of initial symptoms of COVID-19 infection;⁵ 3) some still unknown deaths of quarantined people. In our opinion it is quite sure that there is actually a cohort of patients that experienced aneurysm's rupture and which is at risk of rebleeding, the most important factor that negatively influence the overall mortality. We believe that this fragile population of patients may be part of "collateral damages" of COVID-19 and we would like to raise awareness of Emergency Departments about this issue. Further multicentric studies including leading centers in neurovascular surgery are needed in order to clarify the epidemiology of SAH within this extremely critical contest.

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References

1. Velly LJ, Bilotta F, Fabregas N, Soehle M, Bruder NJ, Nathanson MH; European Neuroanaesthesia and Critical Care Interest Group (ENIG). Anaesthetic and ICU management of aneurysmal subarachnoid haemorrhage: a survey of European practice. Eur J Anaesthesiol 2015;32:168–76.
2. Tam CF, Cheung KS, Lam S, Wong A, Yung A, Sze M, et al. Impact of Coronavirus Disease 2019 (COVID-19) Outbreak on ST-Segment-Elevation Myocardial Infarction Care in Hong Kong, China. Circ Cardiovasc Qual Outcomes 2020;13:e000631.
3. Rubin GJ, Wessely S. The psychological effects of quarantining a city. BMJ 2020;368:m313.
4. Lee MS, Park CG, Hughes TL, Jun SE, Whang K, Kim N. The predictive role of health-promoting behaviours and perceived stress in aneurysmal rupture. J Clin Nurs 2018;27:e1068–77.
5. Sommer P, Lukovic E, Fagley E, Long D, Sobol J, Heller K, et al. Initial Clinical Impressions of the Critical Care of COVID-19 Patients in Seattle, New York City, and Chicago. Anesth Analg 2020. [Epub ahead of print].

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Impact of COVID-19 mitigation measures on patients with spine disease in Friuli Venezia Giulia

The new coronavirus disease, abbreviated COVID-19 and declared pandemic by the World Health Organization (WHO) on March 11, 2020, is currently the most discussed topic not only in the popular media but also in the scientific and medical communities. This illness is capable of exponential dissemination and therefore an incalculable global socioeconomic impact. In February 2020, the northern regions of Italy were hit hard by COVID-19, which spread from China between December 2019 and January 2020. Since then, the disease has dominated the public's daily routine: mandatory social isolation rules, closing of national borders, and plans for the imminent health care disaster have permeated the news worldwide. There is no doubt that COVID-19 has become part of everybody's daily life due to the unprecedented conditions it imposes.¹ As of April 9, 2020, the cumulative number of cases in the Region of Friuli Venezia Giulia (FVG) with positive laboratory test result, as reported by the regional authorities,² was 1324; 201 patients were hospitalized in medical departments (Infectious Diseases or Respiratory Medicine Departments) and 61 in Intensive Care Units (ICUs), giving a total of 262 (Figure 1). Compared to epidemic hot spot (Black level) regions such as Lombardy, where doctors are required to deny life-saving care to the sickest and give priority to those patients most likely to survive, FVG has a lower number of infections per capita and can be considered a Yellow surge level, according to the Algorithm proposed by Burke *et al.*³

In this situation, due to the decreased availability of ICUs, all the surgical Departments in FVG cancelled elective surgery and outpatient visits as of March 13, handling only emergencies and urgencies. Regional healthcare services, in accordance with constantly updating national guidelines, have prepared for the current emergency⁴ by:

- postponing elective surgical procedures to a more appropriate time;
- developing planning strategies to carry out urgent operations during the pandemic;
- defining hospitals and dedicated pathways to COVID-19 patients, organizing dedicated operating rooms for emergency procedures of suspected/confirmed COVID-19 patients, with guidance information and posters visible to all professionals;
- ensuring systematic use of appropriate personal protective equipment including gloves, medical masks, goggles or a face shield, and gowns;
- limiting/cancelling the visits of patients' family and friends;
- developing support strategies for healthcare professionals and offering them psychological coping strategies;
- supporting patients through teleorientation, telemonitoring, and teleinterconsultation.

In this letter, we would like to illustrate the current situation of the patients referred to the Spine and Spinal Cord Surgery Department of the Academic Hospital of Udine.

With the advent of COVID-19, the direction has largely suspended all elective surgery. Neurosurgical procedures were rescheduled, and spine surgery, while not requiring access to intensive care, was suspended (besides trauma or acute spinal cord compression). Outpatient access was also reduced beginning on March 13 and only urgent and priority B outpatients can be admitted to the medical practice. Self-sufficient patients must come unaccompanied.

We are permitted to perform only urgent spine surgical procedures, such as spinal trauma, as well as any conditions that require emergency treatment (rapidly evolving spinal cord compression with emergent quadri- or para-paresis). Spinal trauma has diminished during the COVID-19 pandemic as a consequence of limited vehicle circulation. During COVID-19, treatment of spinal metastasis is not considered a priority, unless the patient has acute spinal cord compression. We view the deprioritization of spinal metastasis patients as nonoptimal in the long run. Given that improvements in cancer therapy, coupled with surgery and radiotherapy, have increased survival and quality of life of patients with metastatic disease, we believe that even under COVID-19 conditions, surgical intervention addressing spinal instability or danger of cord compression must be undertaken to reduce pain, avoid neurologic deficit, and stabilize the spine.⁵

Spine-related disorders are among the most frequently encountered problems in clinical medicine. In our unit, the only Spine Department in FVG, disorders are classified at admission into degenerative (56%), traumatic (32%), tumors (9%), or other diagnosis (3%). Excluding trauma patients, at admission 38% of patients with degenerative tumors or other diagnosis presented with neurological deficits. Spine problems are prevalent in neurosurgical practice. Their diagnosis is not always simple, and they can determine neurological deficits and/or neurological pain that is difficult to treat. During the COVID-19 emergency, patients in this condition feel frustrated and abandoned because of their difficulty in accessing the medical practice and/or radiological exams. This difficulty can lead to a dangerous diagnostic delay. The patients have also lost access to the gym and to physical and pain therapy; they face the total impossibility of undergoing surgical procedures. This huge group of patients has been made silent by the epidemic, and no longer finds answers to its problems.

Notwithstanding the COVID-19 emergency, we would like to

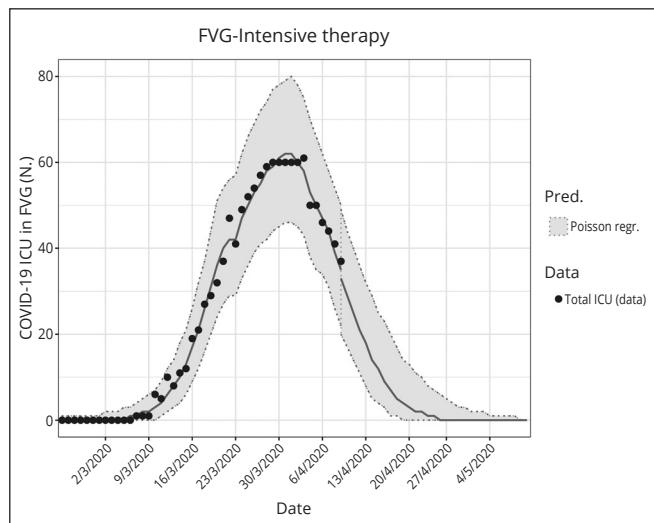


Figure 1.—Graph showing the relationship between observed cases (blue dots in the online version) and predictive cases (continuous red line in the online version). This is the image that today gives us hope!

focus our efforts on patients whose spinal disease puts them at risk of worsening neurological deficit or intractable, opioid-resistant pain, and severe functional limitations. Some spinal pathologies, not related to trauma, can constitute an urgent condition because of the strong connection to quality of life; these pathologies cause damage *quoad valetudinem* which could become irreversible over time.

According to the Checklist for Neurosurgical Cases during the COVID-19 outbreak, some spine conditions must be prioritized for surgery³ from expert neurosurgeons, in a flexible model tailored to the overall health system emergency represented by the viral outbreak level in the local community.

In conclusion, we think that, in Yellow or Red surge level³ or during the phase 2 of gradual return to standard activity, it is important to correctly prioritize but not neglect spine patients in order to offer them the possibility to recover or even improve their neurological status and clinical conditions and quality of life. This reflection could be extended to all provinces or regions in order to produce a shared algorithm and checklist that takes into account the local situation (infected and staffing resources) and the clinical status of the spine patients to modulate the surgical access in a flexible way according to it, in strict compliance with the rules for the pandemic.

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References

1. Ahn DG, Shin HJ, Kim MH, Lee S, Kim HS, Myoung J, et al. Current Status of Epidemiology, Diagnosis, Therapeutics, and Vaccines for Novel Coronavirus Disease 2019 (COVID-19). *J Microbiol Biotechnol* 2020;30:313–24.
2. Dipartimento della Protezione Civile [Internet]. Available from <http://areg.is/Clunv> [cited 2020, Apr 28].
3. Burke JF, Chan AK, Mummaneni V, Chou D, Lobo EP, Berger MS, et al. Letter: The Coronavirus Disease 2019 Global Pandemic: A Neurosurgical Treatment Algorithm. *Neurosurgery* 2020;nyaa116. [Epub ahead of print]
4. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? *Lancet* 2020;395:1225–8.
5. Nakata E, Sugihara S, Sugawara Y, Nakahara R, Furumatsu T, Tetsu-

naga T, et al. Multidisciplinary treatment system for bone metastases for early diagnosis, treatment and prevention of malignant spinal cord compression. *Oncol Lett* 2020;19:3137–44.

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