

Trauma Management During and After COVID-19

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The current COVID-19 pandemic can most certainly be described as a mass casualty incident (MCI). An MCI occurs “when the destructive effects of natural or man-made forces overwhelm the ability of a given area or community to meet the demand for health care” [1]. The greatest difference in comparison with a “typical” MCI is that its presentation is subtle, and it does not require all the emergency services that are usually involved with most MCIs [2]. Furthermore, this outbreak is more than an intensive care phenomenon; it is instead, in some parts of the world, a public health and humanitarian crisis. It requires the skills of social scientists, epidemiologists, experts in logistics, psychologists, and social workers [3]. Hospital resources are fully utilized but trauma surgeons are not involved.

The disease presentation and the preventive measures progressively adopted by many countries, first in Europe and then around the world, have in fact dramatically reduced the number of trauma events. People are confined to their houses with restricted possibilities for socializing.

Even though they are reduced in number, trauma events continue to occur and must be managed to the best of the system’s possibilities with the additional necessity of protecting personnel and patients from possible contagion. Maintaining the capacity to treat trauma patients represents one of the cornerstones of

health care. Many papers have been published in order to share knowledge and experience, although few of them are about surgery. The main Italian surgical societies have published a set of operative guidelines to help in the reorganization of systems in order to manage this unusual situation, based on the experience derived from the (unfortunate) Italian situation [4].

In order to efficiently face the situation, the mitigation phase should be carefully planned and put into action, especially in those countries where COVID-19 has not yet demonstrated its full deadly power. However, an epidemic requires a change of perspective and a move from patient-centered care toward a concept of community-centered care, with the need for decision making to take into consideration the epidemiological and clinical issues of the virus.

Each level of the trauma system must be considered in the reorganization and redistribution of resources and demands.

Regional systems must prepare defined protocols to facilitate the distribution or re-distribution of patients within different hospitals according to the surge in requests for assistance that necessarily involves and overlaps with resources commonly utilized for trauma care.

In each individual hospital, pathways must be reorganized in order to separate patients who are infected or possibly infected, from all others who are definitely not infected. This means preparing separate routes, separate rooms, separate facilities, and even separate buildings to host the two groups of patients. Moreover, a sort of “grey-zone” is required to manage those patients waiting for definitive workup to detect infection or those who have arrived at the emergency department requiring emergency surgical treatments but who are also infected. Dedicated operating rooms and operating areas should be organized in order to maintain the separation of infected from non-infected patients.

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Even though the recognized principles of damage control surgery should be applied, trauma surgeons have to nonetheless keep in mind that the rising tide of COVID-19 takes its toll by restricting access to intensive care unit (ICU) facilities. Trauma surgical procedures need, therefore, to be carried out with the aim of both achieving the best outcome for the patient and reducing the burden of a prolonged stay in ICU.

Trauma teams and shifts of dedicated personnel must be organized in order to respond to all requests in a period of shortage of both material and human resources. All necessary personal protection equipment must be used, and shifts should be reorganized such that there is as much continuity as possible in the persons involved in the management of each infected patient. Moreover, dedicated staff should be prevented from proceeding with ordinary emergency surgery on non-infected patients in parallel with performing the same activity on infected patients. Separate pathways are necessary in order to reduce the risk of contagion of non-infected patients.

The fact that trauma surgeons and ultra-specialized personnel are at present underutilized may lead to health care providers relocating them to COVID-19 ICU or medical wards in order to support colleagues in the management of sick patients.

During an MCI, especially one deriving from infective or easily inter-individual transmissible causes, the careful use of human resources is crucial [3,5]. Trauma and emergency general surgeons and super-specialized doctors should be preserved during an MCI because their contagion or death will lead to the remaining emergencies and necessities becoming impossible to manage. In fact, the consequent lack of experienced teams cannot be solved simply by reintegrating retirees or replenishing the ranks with the newly qualified [2]. The contagion or death of trauma team members would result in a lowering of skills and, consequently, a decrease in the quality of care.

A shortage of blood is something that the countries that are already involved in the pandemic are experiencing. People are not giving blood because of lock-down restrictions combined with the fear of being infected when entering the hospital. This may result in the reorganization of necessary and undemanding surgical interventions, but also in the preparation of campaigns to encourage the population to continue to give blood. As a consequence, this requires the preparation of dedicated environments or facilities to allow blood donors to avoid the risks of coming to the hospital.

Historically, we are living in a period rarely seen before. Our systems are not ready to face this emergency, from an organizational point of view rather than from a technical or medical one. An actual pandemic is something that has rarely been faced before. We are dealing with something that we usually read about in newspaper reports from far off countries and that we have scarcely thought about in terms of such proximity

to our own lives. In fact, an outbreak of such a deadly infectious disease has not been experienced in our latitude since the early 20th century.

Paradoxically, less structured trauma systems are more able to face this pandemic because of their intrinsic flexibility. More organized and efficient systems will face more problems because they will have to force their organization to rapidly restructure in order to maintain the standard of care. Lessons learned from the dramatic situation we are all living in must be recorded in order to be ready for the next one [6,7]. As Nacoti et al. have recently written: "Western healthcare systems have been built around the concept of patient-centered care, but an epidemic requires a change of perspective toward a concept of community-centered care (...). We lack expertise in epidemic conditions, guiding us to adopt special measures to reduce epidemiologically negative behaviors" [3].

Trauma surgery must begin the extensive task of reorganization so that systems are structured to be able to rapidly change setting in order to face such infectious outbreaks without contributing to the general chaos, but instead responding rapidly to the needs.

Ethics Statement

- (1) All the authors mentioned in the manuscript have agreed to authorship, read and approved the manuscript, and given consent for submission and subsequent publication of the manuscript.
- (2) The authors declare that they have read and abided by the JEVTM statement of ethical standards including rules of informed consent and ethical committee approval as stated in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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REFERENCES

- [1] Goodwin J. NAEMT National Survey on EMS preparedness for disaster and mass casualty incident response. 2017. <http://www.naemt.org/docs/default-source/ems-agencies/EMSPreparedness/2017-naemt-ems-preparedness-report.pdf?sfvrsn=0>. Accessed March 2020.
- [2] Coccolini F, Sartelli M, Kluger Y, et al. COVID-19 the show down for mass casualty preparedness and management: the Cassandra Syndrome. *World J Emerg Surg*. 2020; *In Press*.
- [3] Nacoti M, Ciocca A, Giupponi A, et al. At the epicenter of the COVID-19 pandemic and humanitarian crises in Italy: changing perspectives on preparation and mitigation.

- New Engl J Med doi: 10.1056/CAT.20.0080. <https://catalyst.nejm.org/doi/pdf/10.1056/CAT.20.0080>. Accessed March 2020.
- [4] Coccolini F, Perrone G, Chiarugi M, et al. Surgery in COVID-19 patients: operative indications. *World J Emerg Surg.* 2020; *In Press*.
- [5] Wong J, Goh QY, Tan Z, et al. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. *Can J Anaesth.* 2020 March 11. doi: 10.1007/s12630-020-01620-9 [Epub ahead of print].
- [6] RM Anderson, H Heesterbeek, D Klinkenberg, TD Hollingsworth. How will country-based mitigation measures influence the course of the COVID-19 epidemic? *Lancet.* 2020;395:931–4.
- [7] Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China. *JAMA.* 2020;2019:25–8.