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COVID-19 Challenge: What has Been Done and What Must be Done?

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Abstract

The sequence of systemic measures to combat the COVID-19 pandemic in Russia is described. Some other countries experience of providing the specialized trauma care in a pandemic has been summarized. Almost everywhere, strict measures of infection prevention and treatment were introduced in stages. To date, there are the following generally accepted measures: discontinuation of planned surgeries, screening of emergency patients on COVID-19 with the subsequent separation of patient flows, the maximum reduction of hospital stay length. The special attention should be paid to personal protective equipment. The organizational and medical measures necessary for prevention of such pandemics in the future are described, namely equipping sanitary triage posts, creating a stock of personal protective equipment and disinfectants, developing a plan for transforming general hospitals into hospitals for infectious patients with the allocation of a primary patient reception post and their subsequent distribution into the green or red zones. The importance of pre-operative bed day reduction, telemedicine technologies and the need of healthcare financing increase to solve the tasks are substantiated.

Keywords: COVID-19, pandemics, trauma care, medical personnel protection, telemedicine.

Today, it is clear that the COVID-19 pandemic has become a challenge to the healthcare system in all countries. Huge financial and human resources are involved to help the infected patients. Many general hospitals are transformed to infectious. In these conditions, when the pandemic is in its peak, it is also necessary to address the issues of specialized trauma care. However, the latter is always associated with providing care to the patients of other specialties. Indeed, during a pandemic, not only skeleton injuries occur, but also head injuries, other acute surgical diseases, neurological and cardiological emergencies, and much more. Thus, in pandemic, the adequate operation of one of these services, for example, traumatology, is impossible without a system of multidisciplinary emergency care. Before turning to the principles of building such a system, I would like to refer to the recent history of COVID-19 pandemic development.

Looking back, it should be admitted that after the publication of information about the spread of a new viral infection in China, its true danger and the possible consequences of a wide spread, up to the development of a pandemic, not only in Russia but also in many other countries, were under-

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estimated. As a result, at the beginning of the pandemic, the measures for COVID-19 prevention and treatment did not imply serious structural changes in the healthcare system, but were limited to local measures within medical facilities. Only then did we launch the radically healthcare reorganization, provision the sufficient number of disinfectants and personal protective equipment when the first patients with severe COVID-19 signs and symptoms appeared. A number of hospitals were completely or partially transformed and accordingly equipped into infectious diseases hospitals for the treatment the patients with acute respiratory infections, acute respiratory viral infections and pneumonia of various etiology, including COVID-19. A patient routing system was established depending on the severity of their condition so that patients potentially requiring intensive care were brought to the hospitals with the necessary number of qualified personnel and equipment. For the patients with a mild disease, as well as for rehabilitation after moderate to severe forms, less equipped hospitals were created. The complex of these urgent measures allowed us to maintain the control over the epidemic situation.

The described picture was not exclusive to Russia. To one degree or another, the same mistakes were made in other countries. Everywhere, as experience gained, an understanding came of how to resist infection and how to help the patients with other diseases and injuries. As expected, the number of injuries during the pandemic decreased. Thus, a study by W. Zhu et al. showed that during a pandemic, the number of traffic accidents and street injuries were significantly reduced with the same amount of injuries sustained at home [1].

However, this pattern was not typical for all countries. For example, in India, where there is an acute shortage of healthcare financing, there are always a large number of trauma patients with both acute injuries and complications of unqualified treatment at the previous stages. After the pandemic development, there was a lack of test systems, their high cost and poor quality, which made it impossible to test all patients. V. K. Jain, R. Vaishya noted the need for measures aimed at preventing the infection of medical personnel in this country, and called for a return to conservative treatment where possible. Unfortunately, there were no data on morbidity among the patients and staff in this article [2].

A pandemic care algorithm for patients with severe spinal injuries, which is also applicable in severe skeletal injury, described by colleagues from Thailand. The authors clearly indicated the actions aimed at diagnosing COVID-19 at all stages of treatment, starting with the ATLS protocol and ending in the postoperative period. It was emphasized that special attention should be paid to the personnel protection[3].

In Singapore, the decisions for restructuring the trauma care system were made in three stages. At first, they banned only planned admission of the patients who arrived from disadvantaged regions, masks for all staff and additional eyes and face protection for doctors performing invasive procedures (yellow level). Then the level was increased to orange: a reduction in the number of specialized trauma beds, an increase in the working time of the planned operating rooms, and a reduction in the length of hospital stay. All intubation and extubation procedures were carried out in separate rooms with a limited number of personnel. Thus in March, only 45% of previously planned operations were performed. For fracture surgery, the pre- and postoperative hospital stay time was reduced to a minimum. In total, during this period, an average of 120–160 osteosyntheses, wound debridements, and emergency spinal surgeries were performed per month. The freed staff of the trauma departments was redistributed among other hospital departments.

On April 7, the third phase of the pandemic response began. All non-emergency procedures and surgeries were canceled. The following measures were recommended for the personnel: maintaining distance and segregating employees; screening patients for COVID-19 before surgery; mandatory use of personal protective equipment by staff with preliminary training on their use before admission to work; conservative treatment of injuries where possible; maximum reduction in hospital stay for elderly patients; operations infected with COVID-19 in the operating room with negative pressure; an increase in the time spent by patients on admission for the correct determination of their further routing and the release of the bed fund; the use of telemedicine for patient consultation [4].

The experience of Italy is interesting. This country occupied one of the leading places in Europe in the number of infected patients. They considered two phases of trauma care organization. At first, before understanding the real extent of the pandemic, the medical care was provided to all categories of patients. The difference from the usual mode of operation was waiting in the emergency room until an express analysis on COVID-19 was received. Only in Lombardy, planned orthopedic surgeries in state clinics were suspended. Although, the private clinics of the region continued to perform "one day operations". From the beginning of March, the consolidation of orthopedic and trauma departments was started to ensure separate wards for the patients infected with COVID-19. By this time, the second phase of the treatment process organization started. Non-emergency procedures and planned surgeries were canceled. The maximum number of beds for COVID-19 patients treatment were released. Several hubs were created for the treatment of emergency patients with various conditions: severe skeletal trauma, acute cardiovascular and neurological diseases, including the special hubs for COVID-19 patients treatment. In all these hospitals, the patients were considered infected with COVID-19, with all precautions by the staff, until the negative tests arrived [5].

Detailed information on the selection of patients for all surgical profiles, screening, locations and scope of care, prevention requirements for staff and patients, management and exchange of medical records, and recommendations for rest of medical personnel are contained in the recommendations of the American Academy of Orthopedic Surgeons (AAOS). The document divided all surgical pathology into 5 sections according to their priority. Priority A included interventions that must be performed on an emergency basis (up to 24 hours). In the part related to traumatology, these included open fractures; fractures of the femoral neck in young people; pelvic fractures with bleeding; fractures with damage to large vessels; compartment syndrome; dislocations; necrotic fasciitis; closed fractures with soft tissues damage; complex fractures (only external fixation). Priority B included urgent (up to 48 hours) surgeries: femoral neck fractures in the elderly, fractures of the talus neck, diaphyseal femoral and tibial fractures and the distal femoral fractures. All other fracture surgeries were prioritized as C and could be performed within two weeks. All scheduled surgeries were prioritized as D and E and could be delayed for three months or more. This document also presented an approximate staffing table for a trauma department with the allocation of three separate teams that do not intersect with each other. Also very important, the document defined necessary parameters for the computers, networks, data storage format and the exchange of patient information [6].

Other AAOS recommendations provided the most complete and systematic information on the safety measures for personnel and the patient at all stages of the patient's

movement with a detailed description of the necessary personal protective equipment for the staff at each stage. All recommendations were presented not only in text format, but also in the form of easily perceived tables and figures. Principally, in terms of the set of protective equipment and the places of their use, these recommendations do not differ from others. A significant difference is only the requirement for staff to undergo the simulation-based training in the use of personal protective equipment, as well as the skills to care for COVID-19 patients. This type of training greatly reduces the risk of personnel infection. In addition, the need for psychological support for patients and staff was emphasized [7]. The same principles of patient selection and specialized trauma care organization with an illustration of clinical care models were described by D. Stinner et al. [8].

Thus, the principal scheme of action during the pandemic appears quite distinctly. In different countries, it is implemented in different ways, but all agree on measures to minimize the number of surgeries, to complete them as quickly as possible, and to use adequate personal protective equipment. Currently, detailed recommendations for the treatment of surgical patients, including injuries, are available at all international professional associations websites. They are improved over time, but now the main points are clear and will not be subject to revision in the foreseeable future.

An analysis of the situation with the COVID-19 in different countries showed that almost everywhere similar mistakes were made and everywhere there were similar defects in the patients care. The prevention measures were introduced everywhere in stages with the actual delay in introducing serious quarantine measures. In many countries there was a shortage of personal protective equipment. Many doctors underestimated the need for isolation from each other. The last two circumstances have caused a rather high infection rate among the staff in most countries. Today it is clear that in the near future the pandemic will end. Our task at this stage is not to search whose who is guilty, but to create such a prevention and treatment system of airborne and contact infections which make such pandemics impossible in principle.

So, what do we need to have in all medical facilities in "peacetime"? Personal protective equipment should be in sufficient quantity and accessible, as well as a sufficient amount of disinfectants. A plan for the rapid transformation of a facility to operate with infectious patients, from the post of initial admission to patient subsequent distribution in the green or red zones, should be ready beforehand. It is also necessary to establish a new staffing table for epidemic period with predetermined functional responsibilities. Entrance to the "red" zone and exit from it should be through sanitary triage posts which should be available in all hospitals. Outside the epidemic, they are mothballed, but if necessary, should quickly begin to function. In existing hospitals, this will require restructuring, in those under construction and planned it is necessary to foresee their existence.

A separate problem is the provision of the treatment process and operating room equipment. As mentioned above, in a pandemic, it is necessary to minimize the hospital length of stay of the trauma patient. It should be reduced due to the preoperative bed day as well. In other words, after the admission, the patient should be examined and operated as soon as possible. For this, we need a well-functioning system of medical care at the admission department, a round-the-clock team of qualified surgeons and surgical personnel with the necessary equipment, a sufficient number of implants and instruments for their placement. Not every hospital can boast of this in normal times, not to mention working in a pandemic. Also, it is advisable to have operat-

ing rooms with negative pressure. Although, as of now, we have very few of them. This means that today most surgeons work in the ordinary operating rooms, thereby increasing risks to be infected.

The issues of telemedicine cannot be ignored. Most likely, in one form or another, online consultations will take their place in our healthcare. It is necessary to develop a legislative framework for such advisory techniques and determine the procedure for their payment in the health insurance system.

No doubt, the world after the pandemic will change. The system for providing specialized trauma care will also be different. Our American colleagues already predict the following changes: telemedicine and virtual visits to the doctor will become popular, the role of formal rehabilitation treatment under the supervision of a doctor will decrease. It will be replaced by virtual classes in the postoperative period. Interactive postoperative rehabilitation sites will also be developed. These technologies will make contact with a specialist easier and more affordable. As regards the surgical practice, many surgeries, including rather large in volume, will be performed not in hospitals, but in surgical centers for outpatient surgery. This will reduce the hospitals income and force them, in turn, to apply more economically feasible technologies, which will be grounded on evidence-based medicine [9].

This is the view of our American colleagues. But in Russia, we have a different system of medical care, a different level of health care financing, and different citizens mentality. Therefore, we may take into account our colleagues conclusions, but we must develop our own concept of post-pandemic organization of healthcare in general and trauma care in particular. For that matter, first of all, it is necessary to recognize the a large deficit of healthcare financing, which during the pandemic became apparent not only for specialists. The need to reconsider attitudes towards healthcare financing should become the position of professional associations, including the Association of Traumatologists and Orthopedic Surgeons of Russia. Most likely, based on an analysis of the results of the pandemic, a decision to increase healthcare financing will be made. Nevertheless, the development and phased implementation of those organizational and treatment measures, mentioned above, are already expedient.

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