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ORGANIZATION OF INTENSIVE CARE SERVICE FOR PATIENTS WITH COVID-19 DURING PANDEMIA (REVIEW)

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Abstract

Since the beginning of the new coronavirus infection pandemia over 57.9 million people have been infected and over 1.3 million have died. The world statistics on COVID-19 rates Kazakhstan as 49 with revealed cases of COVID-19 and 53 with deaths cases.

In 80% of patients with COVID-19, COVID-19 have mild or moderate disease, about 15% have severe disease requires oxygen support, and 5% have a critical illness requires stay in intensive care units. The average duration of ICU stay is 10.8 days. In 22.7% of patients, ICU length of stay is over 30 days. The mortality rate of patients in intensive care units was 40-61% during the first wave, but in most affected regions it was as high as 90%.

In order to improve the results of intensive care, a team-based way introduced in many hospitals. These teams do most labor-consuming and potentially dangerous manipulations. This approach requires a sufficient number of engaged and well-trained staff.

In in an acute shortage of ICU staff, some actions assumed to train medical personnel of other specialties to become doctors and nurses in intensive care units. Short and superficial courses, designed to prepare the maximum number of intensive care specialists in the shortest time, as a rule, leads to a deterioration in the quality of the provided intensive care and does not improve results and mortality.

Keywords
COVID-19 pandemia, critical care, intensive care service organization

Пандемия жағдайында COVID-19 науқастарына қарқынды емдеу көмегін ұйымдастыру. (Әдебиет шолуы)

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Аңдатпа

Коронавирустық инфекция тарала басталғаннан бері 57,9 миллион адам осы уақытқа дейін жұқтырды, 1,3 миллион адам қайтыс болды. COVID-19 бойынша дүниежүзілік статистикада Қазақстан инфекцияның анықталған жағдайлары бойынша 49 орында, қайтыс болған науқастар саны бойынша 53 орында тұр.

COVID-19-ды жұқтырған науқастардың 80%-ында ауру жеңіл немесе орташа ауыр түрінде өтеді, шамамен 15%-ында оттегінің қолдауын қажет ететін аурудың ауыр ағымы дамиды, ал 5%-ы аса қауіпті ағымға ие, бұл науқастар қарқынды терапия бөлімшесінде ұзақ мерзімді қарқынды терапияны қажет етеді. Сонымен қатар, қарқынды терапия бөлімшесінде науқастардың болуының орташа ұзақтығы 10,8 күнді құрады. Ал 22,7% науқаста қарқынды емдеу бөлімшесінде емдеу ұзақтығы 30 немесе одан көп күнді құрады. Қарқынды терапия бөлімшелеріндегі науқастардың өлім-жітім деңгейі бірінші толқынның шыңына жетті - 40-61%, ал кейбір аймақтарда 90% дейін.

Қарқынды терапияның нәтижелерін жақсарту үшін әртүрлі ауыр және ықтимал қауіпі жоғары манипуляцияларды орындауға командалық тәсіл енгізіледі. Бұл тәсіл жұмыспен қамтылған және жақсы дайындалған қызметкерлердің жеткілікті санын қажет етеді.

Кадрлардың жетіспеушілігін нәтижесінде, реанимация бөлімшесінің дәрігерлері мен медбикелері болу үшін басқа мамандықтағы медициналық кадрларды даярлау және қайта даярлау бойынша шаралар қабылдануда. Ең қысқа мерзімде қарқынды терапия мамандарының максималды санын дайындауға арналған қысқа және үстірт курстар, әдетте, көрсетілген реанимациялық көмек сапасының нашарлауына әкеліп соқтырады және емдеу нәтижелері мен өлім жағдайларын жақсартпайды.

Түйін сөздер
COVID-19 пандемия, қарқынды емдеу, қарқынды емдеу көмегін ұйымдастыру

Организация реаниматологической помощи пациентам с COVID-19 в условиях пандемии. (Обзор литературы)

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Аннотация

С начала распространения новой коронавирусной инфекции на данный момент инфицированию подверглись 57,9 миллионов человек, умерло 1,3 миллиона. В мировой статистике по COVID-19, Казахстан занимает 49 место по количеству выявленных случаев заражения и 53 место по количеству умерших пациентов.

У 80% пациентов с COVID-19 болезнь протекает в легкой или средне-тяжелой форме, примерно у 15% развивается тяжелое течение заболевания, требующее кислородной поддержки, а у 5% наблюдается критическое течение, которое требует достаточно длительной интенсивной терапии в отделениях реанимации. При этом, средняя длительность пребывания пациентов в ОРИТ составила 10,8 суток. А у 22,7% продолжительность лечения в ОРИТ составила 30 и более дней. Летальность пациентов, находящихся в отделениях реанимации достигала на пике первой волны 40-61%, а в некоторых регионах до 90%.

С целью улучшения результатов интенсивной терапии внедряется командный подход к выполнению различных трудоемких и потенциально опасных манипуляций. Такой подход требует наличия достаточного количества задействованного и хорошо подготовленного персонала.

Испытывая резкий дефицит кадров, предпринимаются меры по подготовке и переквалификации медицинского персонала других специальностей во врачей и медицинских сестер отделений интенсивной терапии. Краткие и поверхностные курсы, предназначенные в кратчайшие сроки подготовить максимальное количество специалистов по интенсивной терапии, как правило приводит к ухудшению качества предоставляемой реаниматологической помощи не улучшает результаты лечения и летальности.

Ключевые слова
Пандемия COVID-19, интенсивная терапия, организация реанимационной помощи

In December 2019, an outbreak of respiratory infection caused by an unknown coronavirus occurred in Wuhan, Hubei Province, People's Republic of China. The causative agent of the new coronavirus infection is believed to be a recombinant of the bat coronavirus and the unknown in origin coronavirus. On February 11, 2020, it was named SARS-CoV-2 by the International Virus Taxonomy Committee. At the same time, the World Health Organization (WHO) has assigned the official name of the infection caused by the new coronavirus - Coronavirus disease 2019 (COVID-19). Given the wide and rapid spread of SARS-CoV-2, WHO announced the start of the COVID-19 pandemic on 11 March 2020.

Since the spread of the new coronavirus infection, 57.9 million people have been infected so far and 1.3 million have died. According to Dadax, Kazakhstan ranks 49th in the number of detected cases of infection and 53rd in the number of patients who died (https://www.worldometers.info/coronavirus/).

The terms "novel coronavirus infection", SARS-CoV-2 virus infection and COVID-19 disease are synonymous.

The causative agent COVID-19 can be detected 1–2 days before symptoms appear and within 7–14 days after symptoms appear in upper respiratory tract swabs. In severe forms, a longer shedding of the virus is possible. Data on the duration and strength of immunity for SARS-CoV-2 are currently ambiguous.

The main target of the virus is type II alveolar cells (AT2) of the lungs, which have type II angiosin-converting enzyme (ACE2) receptors, which determines the development of pneumonia. In the pathogenesis of severe forms of the disease, a significant role belongs to the cytokine storm with the release of an excess amount of pro-inflammatory cytokines, primarily interleukin-6 (IL-6).

The incubation period, according to many centers, lasts from 2 to 14 days, on average 5-7 days.

Epidemiological and virological studies show that transmission of infection occurs mainly from patients with a clinically pronounced picture of the disease to other people through close contact by airborne droplets, through direct contact with an infected person or through contact with infected objects and surfaces (1-3).

Clinical and virological studies, during which repeated collection of biological samples from patients with confirmed infection were carried out, show that the release of SARS-CoV-2 occurs most intensively from the upper respiratory tract (nose and throat) in the early stages of the disease (5-7). within the first 3 days after the onset of symptoms (7-9).

In the clinical picture, the most common symptoms are;

- increased body temperature (> 90%);
- cough (dry or with a small amount of phlegm) in 80% of cases;

- shortness of breath (55%), while the most severe shortness of breath develops by 6-8 days from the moment of infection;
- myalgia and fatigue (44%);
- a feeling of congestion in the chest (> 20%).

The first symptoms may include:

- myalgia (11%);
- confusion of consciousness (9%);
- headaches (8%);
- hemoptysis (5%);
- diarrhea (3%);
- nausea, vomiting;
- heartbeat.

These symptoms at the onset of infection can be observed in the absence of an increase in body temperature.

Clinical variants and manifestations of COVID-19:

- acute respiratory viral infection (affecting only the upper respiratory tract);
- pneumonia without respiratory failure;
- pneumonia with ARF;
- ARDS;
- sepsis;
- septic (infectious toxic) shock.

COVID-19 can be accompanied by mental and neurological disorders, including delirium or encephalopathy, agitation, stroke, meningoencephalitis, impaired smell or taste (19), anxiety, depression, and sleep disturbances. In many cases, neurological manifestations were observed even in patients without respiratory symptoms.

Classification of COVID-19 by severity:

Light:

- Body temperature below 38.5^{0}C, cough, weakness, sore throat.
- Lack of criteria for moderate and severe course.

Moderate:

- Fever above 38.5 0C;
- NPV more than 22 / min;
- Shortness of breath during physical exertion;
- Pneumonia (confirmed by CT of the lungs);
- SpO2 <95%;
- serum CRP over 10 mg / l.

Severe:

- NPV more than 30 / min;
- SpO2 ≤ 93%;
- PaO2 / FiO2 ≤ 300 mm Hg;
- Progression of pneumonia (increase in the area of infiltrative changes by more than 50% after 24-48 hours);
- Decrease in the level of consciousness, agitation;
- Unstable hemodynamics (systolic blood pressure less than 90 mm Hg or diastolic blood pressure less than 60 mm Hg, diuresis less than 20 ml / hour);
- Arterial blood lactate> 2 mmol / L;
- qSOFA> 2 points.

Extremely severe:

- ONE with the need for respiratory support (invasive ventilation);
- Septic shock;
- Multiple organ failure.

Severe, extremely severe, and sometimes moderately severe course of the disease requires the transfer of the patient to the intensive care unit and intensive care unit.

In the context of the fight against COVID-19, WHO has set the following objectives for health systems: 1) slow down and stop transmission of the virus; 2) ensure optimal care for all patients; 3) minimize the negative impact of the epidemic on health systems, social services and economic activities.

As part of solving these problems, in order to ensure a timely increase in the volume of clinical and sanitary-epidemiological measures, the WHO document “Practical aspects of organizing the management of COVID-19 cases in hospitals and at home” was prepared, describing the key actions that should be taken in each of the following transmission scenarios: no cases; sporadic cases; clusters of cases; the spread of the virus among the population.

While most patients with COVID-19 have mild (40%) or moderate to severe (40%) disease, about 15% develop severe disease requiring oxygen support, and 5% have extremely severe disease (critical) course with complications such as respiratory failure, acute respiratory distress syndrome (ARDS), sepsis, septic shock, thromboembolism and / or multiple organ failure, including acute kidney and heart damage (10). Elderly age, smoking (11, 12), and comorbidities such as diabetes, arterial hypertension, heart disease, chronic lung disease, and cancer are noted as risk factors for the development of severe illness and death. The results of multivariate analysis confirmed that older age, a high score on the scale for dynamic assessment of the severity of organ failure (SOFA) and the D-dimer marker> 1 μg / L during hospitalization correlated with higher mortality (13, 14).

The mortality rate of patients in intensive care units at the peak of the first wave reached 40-61%, and in some regions up to 90%, despite the use of high-tech methods of intensive care (15,16, 17).

In addition, the very implementation of intensive care measures in some clinics was quite problematic due to the lack of resources, which arose because of a large number of critically ill patients and the length of their stay in intensive care units (18).

While COVID-19 has spread globally, the burden on healthcare facilities is not uniform, a number of regions in Italy that have experienced rapid spread

of the virus reported lack or lack of resources in the healthcare system, which appears to have contributed to the high mortality (16). At the same time, clinics in Canada located in regions with a lower number of infected people reported a mortality rate of resuscitation patients of about 15% (19).

In China, Italy and the United States, 70-90% of patients admitted to the intensive care unit required invasive ventilation on the first day. 65.9% of patients required vasopressor and inotropic support. Acute renal failure observed in 27.1% of patients admitted to the ICU. At the same time, the average duration of ICU stay was 10.8 days. In 22.7%, the duration of treatment in the ICU was 30 or more days.

The data above reflects the enormous burden on intensive care units around the world.

Faced with serious challenges in providing medical care to patients with COVID-19, many hospitals around the world have identified the main ones:

- insufficient number of beds in medical institutions
- insufficient number of beds in intensive care units
- insufficient number of intensive care doctors
- insufficient number of nurses in the intensive care and intensive care units
- insufficient number of artificial lung ventilation devices

The pronounced shortage of both medical and non-medical personnel limits the real possibilities of medical institutions.

The surge in demand for health care is adding to the pressure on inpatient unit capacity, affecting the intensive care sector the most.

Rapid changes in conditions necessitate constant professional development of personnel, as well as frequent and accurate updating of information.

Most countries, along with the organization of logistics activities to equip and provide hospitals with medicines, personal protective equipment, medical equipment, increase the hospital bed capacity, attract additional medical personnel and create consultation centers. At the state level, programs for additional funding, training and attracting specialists are being developed, new clinics are being built.

The government of many countries has taken a number of measures to organize, optimize and improve the health sector during the pandemic:

- opening kindergartens and schools for the children of medical workers, as well as representatives of other professions experiencing increased stress during the pandemic;
- simplification of the requirements for licensing and registration of medical workers;
- attraction of retired medical workers, as well as graduate medical students;
- attracting students of medical universities;
- engaging civilian and military services to assist nursing staff;
- provision of security measures for medical workers in private practice, including through telemedicine;
- providing medical personnel with regular testing for the virus;
- cooperation of government agencies with private clinics;
- development and production of our own models of ventilators;
- construction of new intensive care units based on congress halls, stadiums, mobile hospitals, floating clinics, etc .;
- reduced requirements for clinical trials and administrative reporting;
- permission for patients who received prescription drugs to purchase them in the future from local pharmacies without a prescription;
- organization of a drug delivery service to the most vulnerable groups of the population;
- temporary suspension of planned operations;
- suspension of the export of medicines, protective clothing and medical masks;
- creation of strategic reserves of medicines and protective equipment;
- creation of a medical emergency response team of volunteer doctors to work in regions with the most difficult situation with COVID-19 and to help health organizations;
- simplification of public procurement procedures;
- strict regulation of prices for medicines;
- redistribution of patients to reduce the burden on clinics in the most affected regions;
- Providing medical and social workers with free travel in public transport and taxis;
- restricting access to clinics for the patient's relatives (20).

At the same time, most of the measures taken help to buy time to strengthen the health system and improve the efficiency of infrastructure, but they do little to optimize the most essential element of health care - the medical and auxiliary personnel of intensive care units. To provide medical care to critically ill patients, trained multidisciplinary specialists (resuscitators) are required who are able to control any changes associated with both this complex disease and the decompensating of coexisting diseases (21).

From open news sources, we know that to reduce the workload on staff in intensive care units and protect them from infection, each hospital separately creates different teams that perform separate functions: a team for tracheal intubation, a team for cardiopulmonary resuscitation (22 , 23),

a team of consultants, a team for transporting critically ill patients inside the hospital, teams of physiotherapists, etc. Moreover, the composition and appointment of such teams is determined by each clinic itself. For example, in hospitals in China, the team of specialists in tracheal intubation and the team for resuscitation involves 4-18 people in each, in addition to the main practical assistance in the departments of the clinic where these teams are created, they are engaged in methodological assistance in the form of developing various nosocomial guidelines and algorithms.

This approach requires a large number of committed and well-trained staff. In addition, there is debate about the appropriateness of such teams, believing that the creation of a sufficient number of fully equipped special kits for tracheal intubation and "points" for resuscitation, significantly reduces the need for such teams (24).

Remote counseling centers are most often organized on the basis of medical universities. Such centers include specialists from various fields of intensive care, pulmonology, hematology, neurology, nephrology, epidemiology and other areas of medicine. The tasks of these centers, in addition to advisory assistance, usually include the development of recommendations and guidelines (22). Such centers do not provide practical assistance.

In many capitalist countries, most of the health care system is a private business-oriented sector, with no common management approach. For example, in the United States, where the health care system has a pronounced decentralization, analysts point to the absence of a single central body for managing and organizing health care as a major drawback. At the same time, federal governments do not have enough powers to make such decisions, and attempts to centralize the health care system on a voluntary basis are often met with criticism and misunderstanding (25).

Experiencing a sharp shortage of personnel, health systems in many countries are taking measures to train and retrain medical personnel of other specialties to become doctors and nurses in intensive care units. Short and superficial courses, designed to prepare the maximum number of intensive care specialists in the shortest possible time, usually lead to a deterioration in the quality of the resuscitation care provided, and does not improve treatment results and mortality.

All of the above activities are generally decentralized and are applicable in individual clinics, which makes it difficult to assess the resources of intensive care units on a city or regional scale, and even more so in the country.

In the aspect of the shortage of medical personnel in intensive care units, as well as in order to concentrate information on the available resources and the condition of patients of each medical institution, in our opinion, the most effective will be the creation of mobile multifunctional resuscitation teams, including well-trained intensive care physicians who can simultaneously to provide coordination, methodological, advisory and practical assistance at the local level - in intensive care units, covering all infectious diseases clinics in a settlement or region. By concentrating and analyzing information on the material, technical and human resources of individual intensive care units, information on the condition and dynamics of patients in these departments. Such teams have the potential to provide the listed types of assistance in a timely manner to optimize the treatment, diagnostic and anti-epidemiological processes in intensive care units.

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