

***Review Article*****STANDARDIZED ACUTE CARE DOCTORS TRAINING ON THE EMERGING PANDEMIC OF CORONA VIRUS PNEUMONIA.****\*Umesh Yadav, Awan Kumar, Amrita Kumari Yadav, Ujwal Deo, Bimal Yadav, Sanjay Roy, Jyoti Das, Harishankar Yadav**

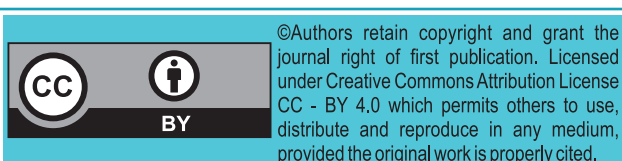
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**DOI: <https://doi.org/10.3126/mjen.v1i1.45861>****ABSTRACT**

The novel corona virus pneumonia epidemic poses a serious challenge to the medical and health systems of all nations in the world, especially discovering the severe shortage of intensive care medical professionals. Although our country's intensive care medicine physicians have played a primary part in the combat against the epidemic, some problems have been debunked in the training of intensive care medicine personnel; equally there is inadequacy of standardized intensive care medicine training platform, and the lack of integrated training content and training format.

Relatively single, insufficient preparations for responding to public health emergencies etc, Based on the actual experience of epidemic prevention and control and the treatment of critically ill patients, this article recommend that standardized training of resident physicians for critical care medicine should be carried out, the training content should be standardized, the combination of theory and clinical practice should be enhanced, the comprehensive quality of resident physicians should be improved, and the training methods should be expanded and strengthened."Construction of a demand and capacity model for intensive care and hospital". These measures can make the critical care team become a professional team with a feel of social importance, which is of great acceptance for the long-term progress of critical care medicine, for the Nepalese medical system to easily respond to public health emergencies, and improve the comprehensive diagnosis and treatment capabilities of emergency and critical diseases. Excess deaths associated with COVID-19 are a direct result of the inadequate capacity of intensive care units and hospital beds.

**Keywords:** Emerging pandemic, intensive care medicine, clinical practice, prevention**\*Corresponding Author:**

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Email: [umy492006@gmail.com](mailto:umy492006@gmail.com)ORCID: <https://orcid.org/0000-001-8202-8733>**Citation**

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## INTRODUCTION

Critical care medicine (CCM) is a clinical medicine subject that studies the occurrence and development of critical diseases, as well as their diagnosis and treatment methods. It includes the provision of organ system support, investigations, diagnosis and treatment of acute illness, end of life care and support of families and provides early treatment of organ dysfunction. Breathing aid devices to support and save the patient's life. With the rapid development of medicine, critical care medicine has become an indispensable, comprehensive discipline in clinical medicine. From a public health event to a natural disaster, critical care medicine has played a very important role. COVID-19 changed work practices in intensive care and deeply affected staff physically, mentally and emotionally. The new type of corona virus pneumonia has brought a huge challenge to the world's public health, and intensive care medicine has played an important role in rescuing severe and critical patients with new coronary pneumonia at home and abroad, and has become a key factor in reducing mortality.<sup>1,2</sup>

The development of intensive care medicine in Nepal has not yet proved its worth in the event of a natural catastrophe<sup>2,3</sup>, but the number of critical care medical staff and the scale of talent training are still seriously inadequate<sup>3,4,5</sup>. Consideration must be paid to the social and organizational conditions in which individuals work, taking into account both practical resources and the mutual dynamics of ICU provision.

Standardized training of resident physicians is the only way to train qualified clinicians<sup>6,7</sup>. Due to various reasons; the major of critical care medicine is not included in the training professional category. At the same time, the related research on intensive care medicine training and personnel training is relatively limited, and most of them are research on specific teaching methods<sup>7,8,9</sup>, Or thinking about the current teaching situation due to lack of a feasible solution to the problem.<sup>10,11</sup>

The authors of this article are involved in patient care and management with critical team at B&C teaching hospital and research center participated in the treatment of severe patients with new coronary pneumonia since first wave of COVID. Data was collected from different hospital of eastern Nepal present in the laboratory after consent. Based on the current status of intensive care medical training, combined with the actual experience of epidemic prevention and control, this article discusses the form and content of intensive care medical training and the

establishment of a "critical medical reserve echelon".

## 1 PROBLEM IN STANDARDIZED TRAINING OF RESIDENT PHYSICIANS IN CRITICAL CARE MEDICINE

Intensive care medicine requires doctors to monitor and evaluate the function of the whole-body organs. Initial warning notes for the detection of deterioration in adult inpatients and the detection of damage to the patient's functional organs, and to give corresponding supportive treatment, which is often carried out in the ward of the intensive care medicine department. During the anti-epidemic period in Nepal, most of the elderly patients we managed at our hospital had long-term chronic underlying diseases with multiple organs and multiple systems, such as heart failure, renal failure, hypertension or diabetes, etc. There were also patients with postoperative or traumatic injuries that needed to be treated. An experience operator training related to anesthesia is required to junior doctors or resident doctors for surgical intervention such as tracheal intubation. However, in the clinical diagnosis and treatment of Nepalese hospital fight against new coronary pneumonia is harsh.<sup>3,4</sup> The professional level of the intensive care medical staff is fluctuating, the homogeneity is poor, the lack of a unified understanding of the pathophysiology of the patient, the evaluation and treatment of the disease are not the same, and therefore there is a big difference between the level of treatment and the results.

Many intensive care medical doctors have not received or only received relevant professional training for a short time, and have not received training in response to public health emergencies. These problems all reflect the current status of intensive care medicine training.

## 1A INADEQUACY OF STANDARDIZED INTENSIVE CARE TRAINING PLATFORM

The Department of Critical Care Medicine treats all kinds of critically ill patients, whose conditions are serious and complex, involving multiple organs and multiple systems, requiring medical staff to have a solid theoretical foundation and strong clinical work capabilities. However, since the major of intensive care medicine is not included in the professional scope of residential training, and there is no independent residential training base, for a long time, training can only be carried out with the help of emergency department, internal medicine, surgery and other training bases<sup>3,12,13,14</sup>; However at the same time, the intensive care medicine profession has not formed a standardized faculty. These factors make it more difficult for residents to be directly competent in critical care-related work after the completion of the residency training, which limits the further develop-

ment of the practice.

### 1B LACK OF STANDARDIZED INTENSIVE CARE PROFESSIONAL TRAINING CONTENT

Critical Care Medicine is an emerging practice, which includes a wide range of disciplines and a wide range of content. Recently, there are limited relevant textbooks that can be referred to, and there is no unified standardized textbook. The rapid development of the practice and the rapid theoretical update has made it more difficult to edit the textbook<sup>13,14</sup>. The unification of teaching materials constitutes only part of the homogenization of training content. Due to the intense clinical work and lack of staff, the different hospitals have different attitudes toward the rotation plan of the residents. As a result, it is difficult for departments to carry out a more scientific and clinical rotation and effectively implement the rotation plan, leaving residents with gaps in overall capacity. The 2019 COVID-19 corona virus disease quickly became a global pandemic; the occurrence of the new crown epidemic has also put forward new requirements for the training of intensive care medical residents. Early classification of patients with severe new coronary pneumonia can help individualized assessment of patients and provide effective classification methods for their treatment and management<sup>15,16</sup>. Therefore, it is necessary to increase the rotation plan of emergency and trauma treatment based on the theoretical knowledge of various disciplines, train doctors to accurately and quickly classify the mild, moderate, and severe diseases, and quickly evaluate organ function, coordinate team management, and deal with emergency situations. Medical staff and medical resources are allocated reasonably.

### 1C THE TRADITIONAL FORM OF PROFESSIONAL TRAINING IN CRITICAL CARE MEDICINE IS RELATIVELY SIMPLE

As an education base, the hospital is the major residential training body. Primary teaching methods such as clinical teaching, knowledge presentations, teaching of scientific research, and case analysis require standardized rotation and clinical teaching. In the clinical teaching of critical care medicine, the patient's condition is rapid and changes quickly, and theoretical teaching is not easy to integrate into practice, and the rapidly changing condition is not helpful to the development of systematic bedside teaching, which causes difficulties in clinical teaching of critical care medicine<sup>14,15</sup>. In the first half of 2020, struggling to prevent and control the new Crown outbreak, colleges and universities across the country closes and begun online video teaching, which still failed to enhance the clinical work capabilities of medical students and residents, and seriously affected the growth of young doctors.

### 1D INADEQUATE PREPARATION FOR PUBLIC HEALTH EMERGENCIES

Failure to detect deterioration of patient in general hospital setting. In the early stage of the new crown pneumonia epidemic, due to the rapid development of the epidemic, a large number of patients needed treatment, especially critically ill patients who needed medical treatment and ICU admission. All countries faced medical runs, which led to enormous challenges for the treatment work.<sup>19,20</sup> The relative shortage of medical personnel with limited experience in serious illnesses is also another reasons for the high mortality rate of patients in some regions. It is very difficult for intensive care physicians to get together in a short period of time, which is usually not required on a normal basis. This requires us to provide corresponding training to the entire medical system to deal with the shortage of professionals. The lack of medical staff's own experience in responding to public health emergencies will also hinder the smooth progress of clinical treatment. Early detection of deterioration, which enables targeted and rapid management, can help reduce the need for transfer to higher acuity units, reduce hospitalization time and costs, and improve survival rates.

### 2 SOLUTIONS FOR THE TRAINING OF RESIDENT PHYSICIANS IN CRITICAL CARE MEDICINE

Establish a foundation of independent training for acute care medical residents. The country is currently developing relevant policies to strengthen the construction of intensive care medicine<sup>7,9</sup>. The structure of a standardized training base platform needs to rely on high-level tertiary teaching hospitals, and should have uniform criteria, be certified by the national expert committee and be reviewed regularly. Its medical technology and teaching awareness has high requirements. According to the training needs of intensive care medicine, a rotation plan that meets the profession is developed, so that the training of residents is more precise, which also shortens the training time of talents, and truly teaches students in accordance with their aptitude to consolidate basic training related to critical care medicine, and better promote the growth of young doctors.

### 2A STRENGTHEN THE CONSTRUCTION OF THE FACULTY OF CRITICAL CARE MEDICINE

The aim of intensive care medicine training is to train qualified intensive care doctors, to better improve the prognosis of critically ill patients, and to encourage the sustainable growth of critical care medical specialty. It's only with strong basic theoretical knowledge that we can apply it to the clinic, combined with clinical and operational skills, that we can really



do a good job of doing a strong clinical job. As the general medicine in hospitals, critical care medicine needs to identify, monitor, and analyze patients with multiple organ dysfunctions, and grasp the main contradictions to provide accurate and orderly support for multiple organ functions. Therefore, standardized training first requires a standardized team of high-quality teachers, and requires teachers to have the following conditions: 1) Extensive basic medical knowledge. Teachers should master a wealth of basic subject knowledge such as physiology, biochemistry, pharmacology, anatomy and pathophysiology, understand the function and morphological change mechanism of the human body in a severe state, better interpret clinical manifestations, and be able to trace the roots of clinical phenomena. This is a prerequisite for becoming a teacher of intensive care medicine. 2) Strict clinical thinking ability. Intensive care medicine cannot simply focus on the functions of individual organs, but evaluate the functions of the patient's whole body organs. Multiple organ dysfunctions are more likely to occur in critical illness. Only clear critical care medicine thinking can connect all the basic clinical knowledge. 3) Strong teaching awareness and teaching skills. Critical medicine physicians are busy with clinical work and heavy scientific research tasks. Only teachers who are passionate about teaching can actively guide students in teaching, are good at thinking about teaching skills, try different teaching methods, mobilize students' enthusiasm, and let students understand critical medicine and master the relevant Knowledge. In terms of teacher construction, hospital and department level support is also an indispensable condition. We should pay attention to teaching at the policy level, fully mobilize teachers' enthusiasm, train and reward young teachers, and formulate corresponding assessment mechanisms to ensure the effectiveness of teacher training 9.

## 2B INTENSIVE MEDICAL PROFESSIONAL TRAINING URGENTLY NEEDS STANDARDIZED TRAINING CONTENT

In order to meet the needs of talent training, standardize the construction and management of critical care medicine, and ensure the sustainable development of critical care medicine, a unified and standardized teaching theory system and authoritative teaching materials are required. Theoretically, it should focus on the basic knowledge of physiology, biochemistry and pathophysiology to learn the new from the past. One should follow WHO critical care training short course and other domestic and foreign textbooks. , Its previous training experience has been recognized at the national level <sup>3</sup>. Meanwhile, it emphasizes the implementation of the rotation plan, the combination of theory and practice, emphasizes the cultivation of comprehensive capabilities such as the humanities,

and formulates the most basic training outline and content.

## 3 BASED ON PATHOPHYSIOLOGY

Critical Care Medicine is a comprehensive discipline that studies the occurrence and development of critical illnesses and their diagnosis and treatment. It is "applied pathophysiology". The treatment concept is "pathophysiological-oriented" treatment, that is, first stabilize the patient's vital signs and explore its pathology. The mechanism and law of physiological changes, buy time to get through the most critical situation<sup>17</sup>. Therefore, the study of theoretical knowledge of critical care medicine should be based on pathophysiology, master the "commonality", and gradually combine the learning process of the characteristics of various clinical diseases, supplemented by clinical case analysis, to better understand the causality of clinical diseases , So as to improve the level of trainees theoretically.

## 3A EFFECTIVELY IMPLEMENT THE PROFESSIONAL ROTATION PLAN FOR CRITICAL CARE MEDICINE

The development of critical care medicine itself is accompanied by many major events such as public health emergencies and natural disasters. In the context of epidemic prevention and control, the training of intensive care medical personnel shoulders the country's responsibility for the rescue of various critical illnesses. This requires us to implement the rotation plan of intensive care doctors in hospitals as soon as possible. Critical Care Medicine is a kind of "general medicine in the hospital", the rotation arrangement is recommended to be carried out in stages: Under the premise of learning basic theoretical knowledge, early multidisciplinary rotation of women and children, such as internal and external women and children, requires "broadness and precision". After the rotation, enter the Department of Intensive Care Medicine for systemic learning. Professional teachers will teach and help to develop learning plans, learn about relevant operations and be able to manage critical emergency first aid in general conditions. Finally, conduct intensive training of chief resident physicians, use theoretical knowledge flexibly, and be an independent Respond to various clinical severe emergencies, thus as to get to the degree of the attending physician in clinical ability.

## 3B STRENGTHEN COMPREHENSIVE ABILITY TRAINING

Critical patients are at critical stage and change rapidly. Most of the patients are in a state of dying. Medical personnel and patient families are under enormous mental stress. Hence, whether it is for the consideration of doctor-patient communication or the



alteration of the doctor's own psychological state, critical medicine physicians are needed to have strong comprehensive capabilities. In terms of medical humanistic quality, we should strengthen the cultivation of intensive care medical personnel's doctor-patient communication and humanistic care ability, and require them to learn to communicate with patients or relatives on the basis of objectively and accurately judging the patient's prognosis and quality of life, and explain accurately and decently, try not to cause psychological harm to patients or family members as far as possible; provide humanistic care and soothing treatment for dying patients, and make efforts to reduce the suffering of patients while enabling them to complete the last journey of life with dignity. At the same time, intensive care training needs to focus on the psychological construction of medical staff themselves. At the outset of the new crown pneumonia outbreak, a large number of patients poured into the hospital, and medical staff worked continuously with high intensity. At the same time, faced with huge psychological pressures such as the death of critically ill patients, insufficient protective materials, and fear of being infected, they were unable to take effective rest for a long time. The physical and mental exhaustion increased the risk of infection<sup>18</sup>. Therefore, in the intensive care medicine training stage, it is necessary to actively carry out the evaluation of the mental state of the physicians, identify potential risks as soon as possible, and at the same time strengthen mental health education and training, pay attention to guidance and relief, and strengthen the psychological quality of the physicians.

#### **4 INTENSIVE MEDICAL PROFESSIONAL TRAINING URGENTLY NEEDS TO EXPAND THE TRAINING FORM**

##### **4A COMBINATION OF BEDSIDE TRAINING AND SCENARIO SIMULATION TEACHING**

The traditional form of bedside teaching and training is still the cornerstone of clinical medicine teaching, and high-quality scenario simulation teaching can indeed provide a useful supplement to bedside teaching. Scenario simulation teaching provides a safe, real and controllable environment for medical education, especially in the field of emergency and critical illness. Scenario simulation training that simulates crisis scenarios, teamwork, and multidisciplinary cooperation has great advantages<sup>18,19</sup>. In the context of epidemic prevention and control, personal protection emphasizes hand hygiene, putting on and taking off protective clothing, goggles, splash screens and other skills training. If there is no scene simulation teaching, it is difficult to achieve actual combat effects; at the same time, under the three-level protection, the routine operations of intensive medical

training such as oxygen therapy, mechanical ventilation, tracheal intubation and cardiopulmonary resuscitation can also be completed with the aid of scene simulation teaching.

#### **4B ATTACH IMPORTANCE TO NEW-TYPE DISTANCE EDUCATION TEACHING AND TRAINING**

Under the influence of the current "normalization" of epidemic prevention and control, distance education has gradually received attention. With the development of information and communication technology and distance medical education, in addition to traditional online teaching, it is possible to add standard online classrooms for critical care medicine and infectious disease prevention and control series. This is also in line with Nepal current requirements for vigorously developing distance education and improving the distance continuing medical education network<sup>8,20</sup>. Comprehensive use of modern education technology, virtual reality, audio-visual and other multimedia and computer network technologies to conduct online theoretical knowledge training for residents, and link it to training and assessment, and listen to the class and answer questions when the line is capped. Including the management of critically ill patients, such as circulatory support, mechanical ventilation, tracheal intubation nutritional support, etc., especially learning about the transmission routes of severe infectious diseases including severe acute respiratory syndrome, new corona virus pneumonia, etc., to enhance protection awareness, all medical staff, especially intensive care resident physicians or junior doctors, should complete the theoretical knowledge training of three-level protection.

#### **5 INTENSIVE MEDICAL PROFESSIONAL TRAINING URGENTLY NEEDS THE CONSTRUCTION OF "CRITICAL MEDICAL RESERVE"**

##### **5A BUILD A "CRITICAL CARE MEDICINE RESERVE" TEAM**

In the residential training stage of various professional fields, a certain period of time (2 months to 3 months) of critical care medicine rotation training should be arranged, and critical care medicine needs to be arranged in the regular annual continuing education courses of doctors and the regular doctor's license renewal assessment. The content of knowledge and skills, such a critically ill reserve medical team can complement the shortage of intensive care medical professionals and will be a new force in responding to public health emergencies<sup>19</sup>. Our country should formulated policies to make critical illness rescue, infection and self-protection, as well as infectious disease prevention and control, health education and

other public health knowledge and skills as compulsory courses for medical staff<sup>[9,20]</sup>. Especially in the current "normalization" of the prevention and control of the new crown pneumonia epidemic, relevant knowledge reserves are also needed by the society.

## 5B STANDARDIZE THE TRAINING FORM AND CONTENT OF "CRITICAL CARE MEDICINE RESERVE"

**Integrated system training:** For the "critical medical reserve", the team is required to act in a unified manner, make on-the-spot adjustments according to the situation, arrange shifts reasonably, and match new and old doctors. When the number of critical care medical personnel is insufficient or the amount of clinical tasks is too heavy, non-critical professional physicians can be recruited to join, and hierarchical full-staff training is required according to their specific tasks<sup>[20,21]</sup>, with the major of critical care medicine as the main body, guarantee the quality of training, evaluate the professional ability, and assign clinical tasks in an individualized manner. In the event of a public health incident, intensive care physicians need to play a central role in the treatment of critically ill patients. Using this as a platform, multidisciplinary integration such as control sense protection and breathing can ensure the quality of clinical treatment. Considering the need to avoid gatherings of people in indoor places during the epidemic, online video case discussions or remote teaching rounds have also played an important role; at the same time, based on the full-staff training of the continuing education platform and the offline small-class on-site teaching model, timely update of the diagnosis and treatment guidelines and the latest literature can significantly improve the professional knowledge of residents and their ability to participate in the diagnosis and treatment of critical illnesses. **Personal training:** strengthen residents' awareness of "self-management", regularly open windows for ventilation, measure body temperature daily and report health status in time, and scientifically divide personal space and objects into contaminated areas, buffer zones, and clean areas. Practically implement hand hygiene, putting on and taking off protective clothing, goggles, splash screens, and protective headgear. At the same time, conduct personal mental health training, adjust the mentality in time in the face of pressure, and cultivate the consciousness of seeking psychological assistance.

## CONCLUSION

The new crown virus pneumonia epidemic has brought huge challenges to the world's public health and triggered our thinking on the construction of the critical care team and should train junior doctors and resident doctors. Increase the standardized training of resident physicians that meet the needs of intensive

care medicine training, rely on large-scale tertiary hospitals, train excellent teachers, standardize training content, and build a training base platform; grasp core training content, strengthen basic theoretical knowledge, and apply it flexibly to clinical practice. At the same time, learn the awareness of infectious disease prevention and control to enhance the comprehensive quality of residents; conduct online and offline training simultaneously, use "scenario simulation" and multimedia remote training to expand various training methods; increase the depth of discipline and focus on the "critical reserve echelon." Emphasizing the training of critical care resident's doctors' ability to respond to public health emergencies is of outstanding implication for the long-term development of critical care medicine and to improve the comprehensive diagnosis and treatment capabilities of critical and critical diseases.

## Conflict of interest:

All authors declare that there is no conflict of interest

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## REFERENCES

- [1] LeBlanc C, Sonnenberg LK, King S, Busari J. Medical education leadership: from diversity to inclusivity. *GMS J Med Educ.* 2020 Mar 16; 37(2):Doc18. DOI: 10.3205/zma001311. eCollection 2020.
- [2] Li L, Xu Q, Yan J. COVID-19: The need for Medical Education and Continuous Training [J]. *Lancet Respir Med.* 2020; 8(4):E23. The DOI: 10.1016 / S2213-2600 (20) 30125-9.
- [3] Neupane HC, Gauli B, Adhikari S, Shrestha N. Contextualizing Critical Care Medicine in the Face of Covid-19 Pandemic. *JNMA J Nepal Med Assoc.* 2020 Jun 30;58(226):447-452. doi: 10.31729/jnma.5153. PMID: 32788769
- [4] Rayamajhee B, Pokhrel A, Syangtan G, Khadka S, Lama B, Rawal LB, Mehata S, Mishra SK, Pokhrel R, Yadav UN. How Well the Government of Nepal Is Responding to COVID-19? An Experience From a Resource-Limited Country to Confront Unprecedented Pandemic. *Front Public Health.* 2021 Feb 17;9:597808. doi: 10.3389/fpubh.2021.597808. eCollection 2021. PMID: 3368112
- [5] D C Angus, M A Kelley, R J Schmitz, A White, J Popovich Jr, Caring for the critically ill patient. Current and projected workforce requirements for care of the critically ill and patients with pulmonary disease: can we meet the requirements of an aging population? [J]. *JAMA.* 2000;284 (21 is):2762-2770. The DOI: 10.1001 / jama.284.21.2762 .
- [6] Halpern NA, Pastores SM, Oropello JM, Kvetan V. Critical care medicine in the United States: addressing the intensivist shortage and image of the specialty. *Crit Care Med.* 2013 Dec;41(12):2754-61. DOI: 10.1097/CCM.0b013e318298a6fb. PMID: 24132037.
- [7] Hayes MM, Chatterjee S, Schwartzstein RM. Critical Thinking in Critical Care: Five Strategies to Improve Teaching and Learning in the Intensive Care Unit. *Ann Am Thorac Soc.* 2017 Apr;14(4):569-575. DOI: 10.1513/AnnalsATS.201612-1009AS. PMID: 28157389; PMCID:

- PMC5461985.
- [8] Ohmer M, Durning SJ, Kucera W, Nealeigh M, Ordway S, Mellor T, Mikita J, Howle A, Krajnik S, Konopasky A, Ramani D, Battista A. Clinical Reasoning in the Ward Setting: A Rapid Response Scenario for Residents and Attendings. *MedEdPORTAL*. 2019 Sep 27;15: 10834. DOI: 10.15766/mep\_2374-8265.10834. PMID: 31773062; PMCID: PMC6869982.
  - [9] Fang Z, Zuo W, Tian J, Su B, Zhang X. [How to improve the teaching ability of young teachers of critical care medicine?]. *Zhonghua Wei Zhong Bing Ji Jiu Yi Xue*. 2020 Mar;32(3):371-373. Chinese. DOI: 10.3760/cma.j.cn121430-20200102-00087. PMID: 32386006.
  - [10] Choperena A, Pardavila-Belio MI, Errasti-Ibarrondo B, Oroviogioicoechea C, Zaragoza-Salcedo A, Goñi-Viguria R, Martín-Pérez S, Llàcer T, La Rosa-Salas V. Implementation and evaluation of a training programme to promote the development of professional competences in nursing: A pilot study. *Nurse Educ Today*. 2020 Apr;87: 104360. DOI: 10.1016/j.nedt.2020.104360. Epub 2020 Jan 29. PMID: 32135456.
  - [11] Davidson JE, Aslakson RA, Long AC, Puntillo KA, Kross EK, Hart J, Cox CE, Wunsch H, Wickline MA, Nunnally ME, Netzer G, Kentish-Barnes N, Sprung CL, Hartog CS, Coombs M, Gerritsen RT, Hopkins RO, Franck LS, Skrobik Y, Kon AA, Scruth EA, Harvey MA, Lewis-Newby M, White DB, Swoboda SM, Cooke CR, Levy MM, Azoulay E, Curtis JR. Guidelines for Family-Centered Care in the Neonatal, Pediatric, and Adult ICU. *Crit Care Med*. 2017 Jan;45(1):103-128. DOI: 10.1097/CCM.0000000000002169. PMID: 27984278.
  - [12] Wilson R, Godfrey CM, Sears K, Medves J, Ross-White A, Lambert N. Exploring conceptual and theoretical frameworks for nurse practitioner education: a scoping review protocol. *JBIR Database System Rev Implement Rep*. 2015 Oct;13(10):146-55. DOI: 10.11124/jbisrir-2015-2150. PMID: 26571290.
  - [13] Alhazzani W, Möller MH, Arabi YM, Loeb M, Gong MN, Fan E, Oczkowski S, Levy MM, Derde L, Dzierba A, Du B, Aboodi M, Wunsch H, Cecconi M, Koh Y, Chertow DS, Maitland K, Alshamsi F, Belley-Cote E, Greco M, Laundry M, Morgan JS, Kesecioglu J, McGeer A, Mermel L, Mammen MJ, Alexander PE, Arrington A, Centofanti JE, Citerio G, Baw B, Memish ZA, Hammond N, Hayden FG, Evans L, Rhodes A. Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19). *Crit Care Med*. 2020 Jun;48(6):e440-e469. DOI: 10.1097/CCM.00000000000004363. PMID: 32224769; PMCID: PMC7176264.
  - [14] Jiang F, Deng L, Zhang L, Cai Y, Cheung CW, Xia Z. Review of the Clinical Characteristics of Coronavirus Disease 2019 (COVID-19). *J Gen Intern Med*. 2020 May;35(5):1545-1549. DOI: 10.1007/s11606-020-05762-w. Epub 2020 Mar 4. PMID: 32133578; PMCID: PMC7088708.
  - [15] Editorial Board Of Chinese Critical Care Medicine. [Healthy China 2030 critical care medicine: challenges accepted—40-year-chronicle of critical care medicine in China]. *Zhonghua Wei Zhong Bing Ji Jiu Yi Xue*. 2019 Jul;31(7):793-800. Chinese. DOI: 10.3760/cma.j.issn.2095-4352.2019.07.001. PMID: 31441399.
  - [16] Wang T, Du Z, Zhu F, Cao Z, An Y, Gao Y, Jiang B. Comorbidities and multi-organ injuries in the treatment of COVID-19. *Lancet*. 2020 Mar 21;395(10228):e52. DOI: 10.1016/S0140-6736(20)30558-4. Epub 2020 Mar 11. PMID: 32171074; PMCID: PMC7270177.
  - [17] Cai H, Xi HT, Zhu Q, Wang Z, Han L, Liu S, Bai W, Zhao YJ, Chen L, Ge ZM, Ji M, Zhang H, Yang BX, Chen P, Cheung T, Ungvari GS, An F, Xiang YT. Prevalence of problematic Internet use and its association with quality of life among undergraduate nursing students in the later stage of COVID-19 pandemic era in China. *Am J Addict*. 2021 Nov;30(6):585-592. DOI: 10.1111/ajad.13216. Epub 2021 Sep 16. PMID: 34532935; PMCID: PMC8652965.
  - [18] Yang G, Li C, Zhu X, Yan J, Liu J. Prevalence of and risk factors associated with sleep disturbances among HPCD exposed to COVID-19 in China. *Sleep Med*. 2021 Apr;80:16-22. DOI: 10.1016/j.sleep.2020.12.034. Epub 2021 Jan 6. PMID: 33540240; PMCID: PMC7834103.
  - [19] Nair SS, Kaufman B. Simulation-Based Up-Training in Response to the COVID-19 Pandemic. *Simul Healthc*. 2020 Dec;15(6):447-448. DOI: 10.1097/SIH.0000000000000513. PMID: 33003128.
  - [20] Kaul V, Gallo de Moraes A, Khateeb D, Greenstein Y, Winter G, Chae J, Stewart NH, Qadir N, Dangayach NS. Medical Education During the COVID-19 Pandemic. *Chest*. 2021 May;159(5):1949-1960. DOI: 10.1016/j.chest.2020.12.026. Epub 2020 Dec 30. PMID: 33385380; PMCID: PMC7772576.
  - [21] Erkhembayar R, Dickinson E, Badarch D, Narula I, Warburton D, Thomas GN, Ochir C, Manaseki-Holland S. Early policy actions and emergency response to the COVID-19 pandemic in Mongolia: experiences and challenges. *Lancet Glob Health*. 2020 Sep;8(9):e1234-e1241. DOI: 10.1016/S2214-109X(20)30295-3. Epub 2020 Jul 23. Erratum in: *Lancet Glob Health*. 2020 Sep;8(9):e1131. PMID: 32711684; PMCID: PMC7377809.