

BEYOND THE OPERATION THEATRE: OUR EXPERIENCE IN COVID-19 ICU

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ABSTRACT

The COVID-19 pandemic took world by storm soon after its emergence. People living in all parts of world fell a prey to this deadly disease. It affected individuals in all walks of life in one way or the other. After declaration of Pak Emirates Military Hospital as COVID-19 specific hospital, development of four intensive care units and involvement of multiple specialties led us to new horizons of clinical care. We experienced a transition of usual medical practice.

Keywords: COVID-19, Intensive care unit, Pak Emirates Military Hospital.

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INTRODUCTION

The fatalities and destructions of COVID-19 knew no limits. This dreadful disease is still in process of evolution. Our lives were also affected in most unexpected way as we ended up working in COVID-19 intensive care unit (ICU) as critical care fellows. Before joining COVID-19 ICU, corona was half myth and half mystery to us as prior to that we had no experience of treating COVID-19 patients. The journey we embraced there after brought us face to face with the abysmal pandemic. After working three and half months in COVID-19 ICU, we have decided to share our experience with rest of the world.

Before COVID-19 many people were oblivious to the existence of intensive care. Loads of patients were admitted to the intensive care units. Intensive care units were expanded, crisis deepened every coming day. We had to work harder than before. In fact capacity to work was stretched and capability reduced. Intensive care unit had undergone a whole transformation where its demand had pressed the need for all nursing and medical staff. Besides treating the sickest patients, critical care goes far beyond this. New protocols were prepared and implemented to meet the sustained extra ordinary demands in critical care. Despite doing all this, initial stages of COVID-19

were defined by uncertainty. Stepping on to ICU during this period was like entering another world. Past few months had been not just grueling and emotionally brutal but also inspiring.

The virus was reported to have reached Pakistan on 26 February 2020 and each and every district in the five provinces of Pakistan had confirmed cases of COVID-19 on 17 June 2020¹.

Designation of Pak Emirates Military Hospital as COVID-19 Specific Hospital

During the crest of disaster, Armed Forces Institute of Rehabilitation Medicine (AFIRM) was initially the center of triage and quarantine for COVID-19 patients. The patients who required critical care, based on sequential organ failure assessment (SOFA) score² were shifted to medical intensive care unit of Pak Emirates Military Hospital (PEMH) which was cordoned from rest of hospital in the beginning. But before long the exponential rise in number of patients overwhelmed the capacity of AFIRM, and therefore Pak Emirates Military Hospital (PEMH) was declared as COVID-19 treatment hospital in April 2020.

PEMH being a tertiary care hospital, generated a compatible and well-matched response to its newly assigned gigantic task and transformed itself to become a flagship military hospital for COVID-19 patients with capacity of over 1200 beds to deal with the epidemic. All out-patient based services were suspended and elective procedures were put on a halt. The patients already

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admitted were transferred to Combined Military Hospital (CMH). All disciplines of medicine, surgery and allied were shifted to CMH promptly to continue their services to people. Doctors, nurses and paramedics were recruited from different hospitals who had no past experience of working in intensive care unit. Anesthesiologists working in operation theatre were also called to join the battle front in the war against COVID-19.

At the time of joining there was one ICU with ten ventilator beds, but over a period of months it enhanced into a sixty bedded mega intensive care setup. Anesthesiologists are distinctively skilled and trained to manage the patients in the intensive care unit and this capability gave us an edge over other specialties. ICU was re-organized as measure of pandemic preparedness with revised protocols and new standing operating procedures. Challenges of working in COVID-19 ICU were immense but we surpassed all the challenges one by one in our resource limited setup.

Enormous Workload

After the declaration of Pak Emirates Military Hospital as COVID-19 Hospital, there was massive influx of patients. Hospital resources came to the point of saturation. All hospital capitals were directed towards procurement of personal protective equipment (PPE), ventilators, biomedical equipment, sanitizers, disinfectants and disposable items. PEMH provided clinical services to almost 19,158 patients of COVID-19 in last 4 months (table). The sickest patients were looked after in critical care units dedicated to COVID-19 patients.

COVID-19 ICU Treatment Protocols

COVID-19 was an evolving disease and new treatment guidelines were being updated day to day and new researches and trials were continuously being carried out. Patients coming directly to PEMH, referred or transferred from other military hospitals were triaged in an organized COVID-19 reception and holding area as per protocol keeping in view of its social and ethical

implications. The pathogenesis and etiology until now remains unclear and we have no pattern to explain why some patients get way more ill than others. The patients were segregated into five clinical groups based on symptoms, signs and findings on high resolution chest computerized tomography (HRCT) as asymptomatic, mild, moderate, severe and critical³. There is still no targeted therapy except for empirically symptomatic treatment. All patients in COVID-19 ICU were given azithromycin, anticoagulants, steroids, statins, antiplatelet drugs, gastro protective therapy, vitamin C and D⁴. COVID-19 patients on ventilator were given enteral feeding after a carefully chalked out dietary plan by dietician. Some novel therapies had promising results that included Convalescent Plasma, Remdesivir, Tocilizumab, Plasma exchange, mesenchymal Stem Cells.

Airway Management And Proning

All the patients with severe COVID-19 were given a trial of conservative management with low threshold of mechanical ventilation. Non-rebreathing mask (NRM) with high flow oxygen alternating with non-invasive ventilation was first-line oxygen therapy that was offered to

Table: Work load of COVID-19 patients.

COVID-19 Out Patient Department	19158
Admission in Pak Emirates Military Hospital	4892
Treated in COVID-19 Intensive Care Units	565
Remained on mechanical ventilation	118
Recovered / Discharged	4605
Died	198
Still in hospital	89

the patients. NRM was relatively a safe choice for COVID-19 patients as it caused minimal dispersion of aerosol⁵ and provided almost 90% and above fraction of inspired oxygen with flows of 15L/minute. Awake proning⁶ proved to be beneficial in many patients. The patients who deteriorated despite high flow oxygen therapy and awake proning were escalated to mechanical ventilation⁷. Mechanically ventilated patients

were proned for 16 to 18 hours in a stretch to improve ventilator parameters and oxygen requirements⁸. Closed suctioning was used in all ventilator dependent patients. Airway management was most dangerous aerosol generating procedure (AGP) during COVID-19⁹, therefore it was done with extreme care. Appropriately fitted N95 mask, face shield was worn with proper PPE before handling of airway. Rapid sequence induction was employed¹⁰ and bougie was used as guide wire for tracheal intubation in all cases exclusively done by anesthesiologists. Bed-side percutaneous tracheostomies (PCT) were done after a period of 14 days as per departmental policy but sometimes done earlier if required. When PCT kits were short in peak of crisis, services of otorhinolaryngologists and anesthesiologists were requested and surgical tracheostomies were done in main operation theatre. Nebulization of spontaneously breathing patients was avoided and metered dose inhaler was used as substitute to nebulization¹¹. Ventilator dependent patients were nebulized with disposable nebulizer kits, attached to close circuits of ventilator. High efficiency particulate air (HEPA)¹², filters and heat and moisture exchange (HME) filters were used in circuits of ventilator.

Shortage of Trained Staff

There was an acute shortage of staff during peak of COVID-19. The deficiency was created due to massive influx of patients and COVID-19 infection among some health care workers and rest being quarantined. Most of the recently recruited health professionals had no former training of treating a critical care patient. The shortage of staff coupled with in-experience was a matter of great concern. The paucity of staff sabotaged the normal nurse to patient and doctor to patient ratio. Before COVID-19, nurse to patient ratio of ICU was 1:1 but it increased to 1:5 to 1:9 and doctor to patient ratio also increased. The working conditions put an immense strain on us as we were battling simultaneously on different fronts. The adaptation to new environment, getting familiar to new protocols, working with different colleagues, acquiring new sets of

skills, teaching and guiding in-experienced colleagues and paramedics was too much to tackle in the crunch of this catastrophe.

Deficiency of Equipment

The increased number of patients on ventilators and extension of ICU beyond ten beds, led to an augmented need of biomedical equipment. Ventilators, CPAP/BIPAP machines and cardiac monitors were also borrowed from other armed forces hospitals. Hospital authorities ensured timely procurement of required equipment. We were besieged by new machinery and it's troubleshooting. Our experience of working with an array of ventilators and anesthesia machines was helpful but this had the price of over-commitment. Machine errors and alarms resulted in limitless ICU calls. Newly recruited staff was not proficient at troubleshooting of complex machinery which led to generation of many unnecessary calls.

Laboratory Dependency

We depended gravely on hospital's laboratory for all the investigations that were advised according to our protocols. The baseline labs were done daily for all ICU patients. The tests pertaining to COVID-19 and cytokine release syndrome were done twelve hourly in most patients that included Serum Ferritin, Serum Lactate Dehydrogenase, C-Reactive Protein Quantitative, Serum Triglycerides, Neutrophil Lymphocyte Ratio, Acute Lymphocyte Count, Interleukin⁶, Quantitative D-Dimers, and Procalcitonin¹³. Trends of these markers were very important in decision making alongside clinical parameters. Tests were requested round the clock. Dispatch riders were frequently shuttling between COVID-19 ICU and laboratory. The over-burden led to frustrating errors of sampling, delays and other mistakes of mismatched IDs. SARS-COV-2 real time PCR¹⁴ was done for spontaneously breathing patients on nasopharyngeal and oropharyngeal swabs and on mechanically ventilated patients with non-bronchoscopic broncho alveolar lavage (NBAL) on day 7, 14, 21, 28 of admission. Arterial blood gases (ABGs) for spontaneously breathing

patients were done 2hrly to 8hrly and for mechanically ventilated patients every 2hrly.

Imaging And Radiology Requirements

All the radiology services were provided by Armed Forces Institute of Radiology and Imaging (AFIRI). The ground floor was dedicated for COVID-19 patients. Telemedicine was utilized for booking appointments. COVID-19 ICU was given a priority. Portable chest x-rays were done every third day in routine. HRCT was done for all patients upon admission and interval HRCT was requested at times if required to help clinical decision making. The reporting of HRCT also carried the severity score with maximum possible score of 40¹⁵. Score greater than 20 indicated severe disease.

Overcoming The Fear Factor

The fear was real and it was taking a heavy toll on health care workers lives, as no novel therapy proved to be hundred percent successful. Not only our own health and safety was at stake but our family was equally at risk of catching the fatal microbe. We had to draw a balance between professional life and own family as we could have been a possible source of infection to our loved ones. We had to quarantine our own selves from kids even after end of duty for considerable period of time to ensure their safety. Life was restricted to the meeting of basic body needs like eating, sleeping and doing some physical activity. Maintaining social distancing at all the time was an incredibly lonely feeling. The dismay and anxiety escalated every time a fellow health worker tested positive for COVID-19. We were living in horror of COVID-19 which annihilated order of civilized world.

Use of Personal Protective Equipment

The only obstacle to the dominion of COVID-19 over health workers working in COVID-19 ICU was a good, and carefully donned personal protective equipment, therefore it had to be worn like an armor. WHO guide lines for rational use of personal protective equipment¹⁶ were adapted. Wearing PPE was a demanding job, especially when it had to be worn for

prolonged period of time. Sweating through the non-breathable material without any break was too taxing and so was the discomfort caused by tight -fitting face mask and goggles, but there was no other way out. Meticulous donning and doffing were essential to prevention of disease which respected no borders. Donning and doffing practices were started well in time and donning and doffing areas were clearly marked.

Telemedicine And Distant Rounds

The critical care department had improvised its own way of dealing with COVID-19. Closed-circuit television (CCTV) cameras were installed in every nook and corner of ICU and live video of patients was displayed on screen in conference room. All lab parameters and vital signs were maintained on excel sheets. A remote or distant round was conducted in a conference room attached to the ICU. Doctors working in vicinity of patients were also taken on telephone line. Trainee doctors, nurses, physiotherapists, dieticians, clinical pathologists and doctors looking after administrative affairs were also involved in the round. The detailed discussions of patient, one by one, took hours and hours and the clinical rounds stretched beyond usual time. The clinical orders were carried out in accordance with decisions taken during rounds. The clinical rounds were dynamic and the exchange of clinical information was continual between different tiers of doctors through WhatsApp groups, telephone, voice calls, text messages and cell phones.

Communication Problems

Maintaining effective communication was a challenge during COVID-19 pandemic. In pre-COVID-19 days, conveying critical updates, discussing treatment plans with attendants and breaking bad news was part of day to day practice of critical care team, but glitches in communication amidst COVID-19 were manifold as most of patient attendants were positive for COVID-19 and were themselves asymptomatic carriers of disease. Therefore communication with patient's family posed a threat of cross infection to health professionals. The room dedicated

for counselling was devoid of central air-conditioning, with good cross ventilation and large windows opening to outside. It was made mandatory for all attendants to have worn N95 masks without filters and to have SARS-CoV-2 Real Time PCR before interactions.

Problems In Patient Transport

Transport issues were more taxing when patient was on mechanical ventilation. Taking the mechanically ventilated patients to radiology suite and dialysis center was mostly the reason of patient transport. Portable ventilators with manual breathing system as back up were utilized. Bacterial and viral filters were used with both manual and portable ventilators to prevent cross contamination. Transport of ventilator depended patient was a daunting task especially with scarcity of experienced manpower.

Post-Covid Recovery Issues

Due to long and more varied list of lingering maladies generally COVID-19 survivors discharged from critical care face tough and lengthy convalescence. They are going to face everlasting physical, cognitive and mental health impairments¹⁷. They need early dedicated access to intense rehabilitation services such as physical speech and occupational therapy to regain their former strength and functioning leading to meaningful quality of life. Gaps in rehabilitation services may harm patients. Without out rehabilitation, intensive care does not make sense.

Disposal of Dead Body

Patients dying in ICU was not new but seeing them dying without family and friends around was unusual and painful. Death of patient was a devastating news for the family and the grief was coupled with the apprehensions related to burial. Health care staff of ICU decontaminated the corpse with hypochlorite containing solution¹⁸ and shifted the dead body in an impermeable bag and wooden coffin to mortuary. After necessary preparation dead body was taken directly to the burial site where limited number of family members were allowed to attend the funeral.

Containment of Disease

It seems that COVID-19 is going to stay. Ideally the disease would be contained after the discovery of effective treatment or immunity via a vaccine. It would however require a massive effort to sufficiently inoculate whole world's population even if vaccine is developed. Till then it can be contained in the shape of social distancing and adopting all the possible preventive measures.

CONCLUSION

We have learnt from the experiences of living through this pandemic that crisis can be overcome only through effective communication, decisive leadership, solidarity, mutual cooperation, developing collective spirit of great social responsibility and implementing preventive measures. In the light of lessons learnt we must look ahead and realize our own mistakes, short comings, deficiencies, adjust our approaches to this pandemic, plan and be more prepared and resilient to face a new crisis in future.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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