

## A Mini-review about Concomitant Burn and COVID-19

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### Abstract

COVID-19 can cause different catastrophic events and mortalities. Therefore, burn hospitals strategies changed during regional peak of COVID-19 pandemic in the world. Some outpatient strategies were introduced to minimize the contact with infected patients. However, admission strategies were based on the severity of COVID-19 symptoms and also severity of burn injuries. The policy for admission to give inpatient care relates to history, symptoms and COVID-19 PCR results. If all the mentioned criteria were negative, the burn patient was admitted to GREEN area or ward. If the patient was suspected or positive for COVID-19, then would be admitted to RED area or ward. Given that some patients may be carriers without specific symptoms, considering a YELLOW area or ward seems logical for these groups. In GREEN areas one care giver for each adult and two care givers for each pediatric patient were allowed. For all care givers wearing medical masks were obligatory. All patients, care givers and staffs were under constant surveillance for fever and other symptoms. In RED areas no visitors were allowed and for each patient one nurse was assigned in BICU. All elective surgeries were stopped and other procedures were divided to emergency and semi-emergency. Strategies for facing COVID-19 surges especially new variants need to continuously evolve. Changing of infectivity rate, manifestations, resistance to different vaccine and duration of viral shedding necessitate modification of principles according to data collected from involving countries.

**Keywords:** burn; covid-19; protective strategies; review

### Introduction

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) disease (COVID-19) and its new manifestations due to multiple evolving mutations cause different catastrophic events and mortalities in the world. It's comorbidity with disease/injury such as burn can aggravate the clinical outcome. Therefore, their management should be meticulous and warrants multidisciplinary evaluations, investigations, treatment and prevention strategies. On the other hand, many protocols for facing the disease, especially new variants of the new pandemic are in evolution. During one of the worst conditions of human beings in the globe from 2020 to 2021, many of the basic, important and effective strategies and guidelines have been introduced. According to epidemiologic statistics during the pandemic in some countries such as UK and Canada, burn injuries were decreased. However, in some countries like the United States and Turkey, the rate of burn injuries was increased and in some other countries did not changed such as Brazil. Burn hospitals or wards policies changed during regional peak of COVID-19 pandemic in the

world. Also burn center strategies according to their facilities and experiences are different across different centers in the world [1].

### Outpatient strategies

Most of the burn centers priority is not to admit burn patients less than 20% TBSA in adults and less than 10% TBSA in children, of course without any other indication for admission [2]. Other preferences were daily dressing instead of multi-day dressing [2-4]. The dressing changed at home with pre-instruction or if possible guided as virtual [2, 3]. If patient with burn wound was positive for COVID-19 or symptomatic, he/she was directed to hospital for COVID-19 patients. In our burn hospital (Zare Hospital, Sari, Mazandaran province, North of Iran) we completely stopped elective surgeries and inevitably changed our routines and one ward (floor) was assigned to non-burnt COVID-19 patients during the first pandemic between March to June 2020 and currently with overwhelming surge of Delta variant. Symptomatic or COVID-19 positive patients with burn that are not indicated for admission routinely, were admitted to the above mentioned ward according to the severity of symptoms, otherwise managed as an outpatient basis. All patients visited

with least frequency, and if necessary, with monitoring of symptoms considering personal protective equipment (PPE) and social distancing.

### Patient admission

The strategy of most centers around the world was to explain the risk of exposure to COVID-19 in the hospitals to all patients and when possible they were encouraged to be managed on an outpatient basis [2].

Burn hospital of Shanghai started careful screening of the patients in order to keep COVID-19 positive patients out of the burn hospital after Wuhan was locked down [3]. All febrile burn patients were guided to test for COVID-19. Symptoms for COVID-19 such as fever were constantly checked after admission [3]. They admitted new severe burn patients to BICU with no visitors and less severe burn patients were admitted in a separate floor with one caregiver, exceptionally pediatric patients with two caregivers, for 14 days. The policy for admission to give inpatient care relates to history, symptoms and COVID-19 PCR results. If all the mentioned criteria were negative, burn patient was admitted to GREEN area or ward. If the patient was suspected or positive for COVID-19, then would be admitted to RED area or ward [5]. According to literature about half contrary, if the patients that were infected with COVID-19 are asymptomatic and can cause transmission of the disease [8]. Negative PCR test or absence of symptoms doesn't mean that patient is clear [5].

Therefore, there is a gap here; some patients are unaware or deny facing COVID-19 patients, these patients were considered as negative. Even though social distancing and PPE by physicians, nurses and others are observed but some of them may be carriers, especially those with Delta variant, and potential admissions in GREEN area or ward may be hazardous and considering a YELLOW area or ward seems logical.

### Cares in burn wards and BICUs

The best condition for these patients is negative pressure room, even though there are limitations about the numbers in some hospitals and basically their existence in some countries [3]. The burn patients were admitted in single side rooms in order to prevent cross contamination [5]. In GREEN areas one care giver for each adult and two care givers for each pediatric patient are allowed. No patients and care givers were allowed to exit the ward [3]. For all care givers, wearing medical masks were obligatory. All patients, care givers and staffs were under constant surveillance for fever and other symptoms. No visitors were allowed in RED areas and for each patient one nurse was assigned in BICU [3]. If physically possible one entry and one exit were used that were controlled by a guard. Social distance controlling, wearing masks by patients and visitors, visitor's thermal screening and hand sanitization are done by the mentioned guard. In some centers testing patients and health care providers for COVID-19 have been repeated weekly until they didn't find any new cases. Differentiation between respiratory symptoms and fever that caused by inhalational burn injury and COVID19 are very difficult [2]. Sometimes both of burn and COVID 19 cause pulmonary injuries and the outcome depends on pre-existing comorbidities and proper management [1]. In our BICU in Zare hospital we have two isolated beds that are assigned to patients who have comorbidity of burn and COVID-19 and the other 12 beds are for severe burn and inhalation injury patients. The two mentioned areas are temporarily physically separated from each other by a tempered glass with different entry-exit ways and have separate health care workers.

### Procedures

All elective surgeries were stopped and other procedures were divided to emergency and semi-emergency. Emergency, life and limb saving procedures such as tracheostomy, fasciotomy, escharotomy and amputation for infected gangrenous limb have been done after a chest CT or without it. For semi-emergent operations such as debridement of burn

wounds and coverage of necessary post debridement burn wounds, PCR and/or chest CT would done before surgery, if necessary [2, 3]. If possible, surgeries with loco-regional anesthesia for non-intubated patients can be helpful.

### Protocols for reducing transmission

Negative pressure rooms can reduce dissemination of aerosols and diseases [2, 3]. Triage of the patients is very important. COVID-19 negative burn patients are admitted in a separate floor, ward or at least an area (GREEN area). Single side room with limited care givers and limited communication has been recommended. Mild to moderate symptomatic COVID-19 burn patients are admitted in a separate floor, ward or area (RED area) and severe symptomatic patients are admitted in BICU with no visitors [1-3, 5]. Suggestion of an intermediate ward or area (YELLOW one) for new coming patients with unclear/denied history seems logical until three days after their PCR tests and symptoms were negative. This appears important especially in new mutate coming variants such as Delta and Lambda.

### Healthcare workers

Care should be given by limited number of staff. Constant changing of surgical masks, water resistant aprons and gloves for each patient intervention in both GREEN and RED areas is necessary. In RED area, for aerosol producing procedures such as burn wound debridement, skin graft and changing of the dressing in shower; FFP-3 fit-tested masks, fluid resistant gowns, visors and gloves are used [2, 3, 5]. Infectivity rate of the disease in aerosol-generating procedures in BICU and operating rooms in burn patients are higher but most of the healthcare workers were from burn ward [9]. Therefore, protection in health workers in wards should be considered more seriously. Most burn centers decrease their workers. Each health care worker should constantly be under observation for symptoms and thermal monitoring every day. Meetings should be held with minimum people and the least amount of time if feasible. Staff's time for resting and eating should be separate from each other [2, 3, 5]. Suspicious health workers are tested and isolated at home or a hotel [2]. Health personnel are grouped in different cohorts, and after long shifts during 1-2 weeks, are quarantined in home/hotel for 2 weeks. An additional team of doctors and nurses are arranged for COVID -19 block. Their return after 2 weeks of quarantine or two negative tests after 5 and 10 days are possible [2, 3]. Therefore, there is another gap; considering the longer time viral shedding of Delta type COVID-19, are these rules and periods enough?

### Discharge strategies

After completing essential part of the burn wound management, the burn casualty should be discharged as soon as possible. Instruction for rehabilitation can be given as prepared papers or websites and continuously managed by webcams and APPs and in condition with the least facilities by phone [4]. Every question can be answered and photos of wounds can be send by patients. Outpatient visits should be minimum and in necessary instances with PPE for healthcare workers and asking by questionnaire and thermal monitoring of the patients.

### Leaderships of the hospital

Leaders of burn centers should communicate with other leaders of burn centers regionally, nationally and even internationally to use the best and newest practices and learned the successful lessons [3].

### Discussion

Human being encountered with a most dangerous pandemic with high transmission and mortality rate. At the beginning mechanisms of viral damage and pathophysiology of the disease were unknown. Therefore, due to lack of protocols and guidelines some of the clinical trials were not

correct and effective. Many data and results of some trials from around the world were gradually collected and these effective guidelines and principals were formed [1-5]. They are very helpful but it seems like there are some gaps and questions, as mentioned above that can be answered slightly by researchers.

## Conclusion

Strategies for facing COVID-19 surges, especially with new variants need to continuously evolve. Changing of infectivity rate, manifestations, resistance to different vaccine and duration of viral shedding necessitate modification of principles according to data collected from involving countries.

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