

# Preparing a deployed role 3 medical treatment facility for COVID-19 in Afghanistan

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## ABSTRACT

The Craig Joint Theater Hospital at Bagram Airfield is the coalition role 3 facility for the North Atlantic Treaty Organization-led Operation RESOLUTE SUPPORT in northern Afghanistan. The onset of the global COVID-19 pandemic in early 2020 presented the challenges of limiting viral transmission, disease force protection, specific protection of healthcare workers and management of patients with COVID-19, all while continuing to provide high-quality care for battlefield trauma. The estimated COVID-19 threat led to the introduction of enhanced force protection measures across the Combined Joint Operations Area-Afghanistan. Surveillance testing of high-risk groups at coalition locations was established. Non-essential movements were restricted and quarantine periods instigated. Protection of healthcare workers and patients was improved with enhanced personal protective equipment as well as structural, procedural and personnel changes across the role 3 facility in order to limit viral exposure and transmission. This occurred in a resource-limited environment without degrading overall clinical capability.

## BACKGROUND AND EXISTING CAPABILITIES

The Craig Joint Theater Hospital (CJTH) is a healthcare facility operated by the 455th Expeditionary Medical Group, United States Air Force, sited at Bagram Airfield (BAF), approximately 40 km north of Kabul, Afghanistan. CJTH is one of two coalition hospitals in Afghanistan with capabilities of a role 3 medical treatment facility (MTF)<sup>1</sup> supporting the North Atlantic Treaty Organization-led Operation RESOLUTE SUPPORT (RS). As well as primary trauma and transfers from role 2 MTFs, it also receives medical emergencies and non-urgent patient referrals of entitled RS personnel. BAF is the primary strategic aeromedical evacuation point of embarkation for coalition patients classified as 'Priority 1 – Urgent'

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(requiring evacuation within 24 hours)<sup>2</sup> and US patients of all categories.

CJTH has an emergency department (ED) comprising a six-bay trauma resuscitation room, two negative pressure side rooms (NPRs) and two general-purpose bays. The theatre suite comprises three operating theatres of equal surgical capability, two are larger and configured to allow two tables simultaneously if necessary. Each theatre has a positive pressure ventilation system. The intensive treatment unit (ITU) comprises 13 beds, including one NPR, capable of managing ventilated patients. The ITU is able to surge to 26 patients by reallocating staff from other areas of the hospital. The intermediate care ward consists of 19 beds, including two NPRs.

CJTH has 34 ventilators in total, including transport models and anaesthetic machines. However, the oxygen generation and supply capacity limits the simultaneous use to 16 ventilators. There was no capability to provide non-invasive ventilation (NIV) or high-flow nasal oxygen (HFNO).

## THE COVID-19 THREAT TO THE COALITION POPULATION

In March 2020 combat operations in Afghanistan were impacted by the COVID-19 pandemic. At that time, the RS mission had a population of nearly 17 000 troops and locally employed civilian support staff, across multiple bases.<sup>3</sup> While non-RS civilian testing capability was limited (and reported low case numbers) across Afghanistan, community prevalence was assumed to be high, as the neighbouring countries of Iran and Pakistan were reporting many cases, and migration of around 300 000 people from these countries occurred during the first six months of 2020.<sup>4</sup>

On review of the potential threat of the COVID-19 pandemic, standardised disease containment precautions were implemented from 15 March onwards. Public health interventions such as social distancing, wearing of cloth masks, closure of dining facilities and gyms, enhanced environmental cleaning, active case containment, and an emphasis on

hand hygiene and cough etiquette were all introduced to locations throughout the Combined Joint Operations Area-Afghanistan (CJOA-A).

Non-essential movements between coalition locations in the CJOA-A were restricted. Coalition personnel due to deploy into the operational space were required to undergo quarantine prior to arrival in Afghanistan, with those due to leave resultantly extended.

## IDENTIFYING POTENTIAL RESOURCE SHORTFALLS FOR MANAGEMENT OF PATIENTS WITH COVID-19

The initial predictive model for potential COVID-19 casualties for CJTH indicated that there would be several shortfalls. There was concern for disrupted supply chains due to decreased air traffic and difficulties with ground transportation. The anticipated primary resource limitations were healthcare worker (HCW) staffing levels, personal protective equipment (PPE), oxygen generation and storage, medications, ventilators, and bed capacity.

HCWs were considered a finite resource, so force protection precautions were taken to attempt to minimise COVID-19 infection in this population. A phased HCW protection plan was established, based on patient volume and risk of exposure, including the evaluation of hospital airflow and filtration. New walls were constructed to close previously open bay patient care areas.<sup>5</sup>

Public health interventions were enforced within CJTH and social visits were prohibited. As alternatives such as telemedicine are impractical in the deployed environment, walk-in patients and outpatients continued, with entry subject to screening questions and strict social distancing.

Additional PPE supplies were ordered. However, although expert consensus guidance recommended surgical masks, due to the uncertainty in airborne transmission and given the finite number of HCWs in a deployed environment, the decision was made to rely on N95 respirators for HCW use. N95s were approved for extended use and reuse and a method of disinfection was also introduced.

Additional oxygen generators were procured, and industrial oxygen tanks evaluated by bioenvironmental engineers for medical use. A tented medical facility constructed adjacent to the hospital at the outset of the COVID-19 pandemic was scaled for 32 beds with stand-alone oxygen generation and supply; however,



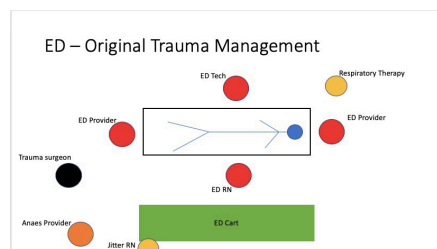
**Figure 1** Personal protective equipment in the emergency department trauma bay managing multiple casualties from a COVID-19 endemic environment.

there was no capability for invasive ventilation.

### TESTING AND IDENTIFICATION OF HIGH-RISK PATIENTS

Successful disease containment plans require early identification of those individuals carrying the disease. Therefore, efforts were made to develop and distribute testing capabilities across the CJOA-A with a variety of molecular and antibody testing kits procured. In addition to PCR-testing symptomatic individuals, a surveillance plan was established in order to evaluate the prevalence of asymptomatic COVID-19 on coalition bases, such as antibody-testing higher risk groups including HCWs, catering staff and gate guards.

The earliest case definitions used to identify a patient under investigation (PUI) included known or suspected exposure, in addition to symptoms of a lower respiratory tract infection. This was in accordance with the initial definition from the Centers for Disease Control and Prevention (CDC). However, as the pandemic progressed and the disease became more widespread, exposure risk was difficult to define. It became clear that viral effects were not limited to the lower respiratory



**Figure 2** Schematic diagram of a pre-COVID-19 trauma team. Anaes, anaesthesia; ED, emergency department; RN, registered nurse.

tract and the case definition was then widened to include additional symptoms.

### DETERMINING THE COVID-19 RISK IN ADMITTING PATIENTS

Patient transfer was recognised early in the pandemic to be a significant threat of exposure and transmission of COVID-19 to transferring personnel, receiving HCWs and the wider coalition population. As it became clear that geographical qualifiers and specific symptoms were unreliable screening criteria, a more nuanced method was introduced based on the number of known COVID-19 cases and the presence of community spread in the patient's location of origin. All patients received from outside of coalition locations were classified as a PUI, based on the estimated high prevalence of the disease among the general population of Afghanistan.<sup>6</sup>

### RECEPTION OF CASUALTIES FROM THE COVID-19 ENDEMIC OPERATIONAL AREA

Receiving ED personnel wore standard PPE for all patients. Protection was enhanced by the addition of N95 respirators and compliant eye protection when receiving PUIs or confirmed COVID-positive patients (Figure 1). Patient triage occurred outside the entrance to the ED in a covered, open-air location, with the patient then taken inside to either an NPR, the trauma bay or a standard ED bay based on both their presenting illness or injury and their COVID-19 risk assessment. Patients not meeting the criteria for trauma team activation but considered a PUI would be preferentially placed in an NPR. In the event that a high-risk aerosol-generating procedure (such as endotracheal intubation) was indicated, an interdisciplinary discussion would occur between the relevant specialties to assess the necessity of the procedure and the most appropriate location to undertake it.

### REDUCING THE RISK TO THE TRAUMA RESPONSE

Prior to the COVID-19 pandemic a typical trauma team activation consisted of a trauma surgeon, anaesthesia provider (AP), emergency medicine (EM) provider, respiratory therapist (RT), two EM nurses and two EM technicians (Figure 2). Additionally, staff from radiology, pharmacy, biomedical science and surgical subspecialties could also be present within the trauma bay.

In order to reduce the potential virus exposure to HCWs, following discussion among senior clinicians, all trauma

casualties were designated a PUI and the receiving bedside composition for trauma team activation was reduced to a trauma surgeon, AP, EM physician, one EM nurse and one EM technician (Figure 3). All other medical personnel were to assemble outside the trauma bay but would be able to watch the initial patient management on closed circuit television installed for this purpose.

Several exercises with increasing numbers and severity of casualties were undertaken to test the new team composition. The principle to not surrender an excellent level of trauma care to the demands of COVID-19 required the team to be ready to adapt rapidly as the clinical situation demanded, such as for a decompensating patient or mass casualty situation.

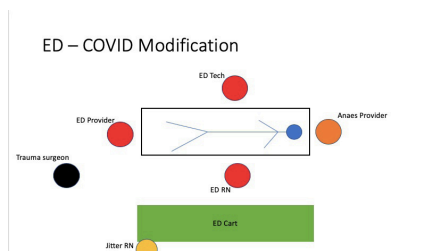
### MANAGING THE DETERIORATING PATIENT WITH COVID-19

Patients admitted for COVID-19 management had the potential for rapid respiratory decompensation requiring intubation. Therefore, a protocol was developed by the department of anaesthesia to reduce the transmission risk to HCWs (and other patients) during emergency endotracheal intubation. Invasive ventilation could be required rapidly due to the unavailability of NIV or HFNO as a temporising measure.

A Mayo stand of disposable intubation equipment was developed for each treatment room, with contingency supplies kept outside the treatment area (Box 1). A dedicated 'clean' runner was present for all intubations. Ordinarily, the intensive treatment unit team would apply a face mask or a reservoir mask to preoxygenate, but due to the higher likelihood of aerosolisation<sup>7</sup> a Mapleson F circuit was used with a viral filter to allow a better mask seal.

Should the patient be in a multi-patient bay, an intubation hood was used to reduce viral exposure to other patients and staff (Figure 4). The frame was designed and commissioned by the anaesthetic department and constructed by the base plumber out of plastic pipe. It was then covered by a C-Armor drape (TIDI Products, Neenah, Wisconsin, USA). The transparent plastic drape allowed the practitioner the ability to see while maintaining a physical barrier. Reaching underneath the draped plastic, the practitioner could easily manage the airway.

The composition of the team for emergency intubation was reduced to a safe minimum. The preprocedure brief and



**Figure 3** Schematic diagram of the modified trauma team for a patient of unknown or confirmed COVID-19 infection status. Anaes, anaesthesia; ED, emergency department; RN, registered nurse.

preparation of equipment would occur outside of the NPR or bay, following which only an AP, nurse and RT would don the required PPE and enter the room. A rapid sequence induction would be performed<sup>8</sup> and a viral filter attached to the endotracheal tube (ETT) immediately. The transparent plastic drape used for the intubation hood could be disposed with the other clinical waste, and the plastic frame disinfected with wipes.

### GENERAL PERIOPERATIVE PRECAUTIONS FOR LOW-RISK SURGICAL CASES

Due to the non-elective nature of surgical intervention and also the limited availability of testing resources in the operational environment, it was deemed impractical to expect a preoperative

#### Box 1 Emergency intubation kit for the deteriorating patient with COVID-19

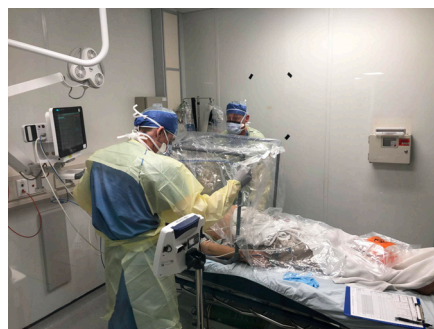
##### Intubation Mayo stand: inside the patient's room.

- ▶ 14 Fr disposable ETT stylet.
- ▶ 10 mL syringe.
- ▶ 90 mm oropharyngeal airway.
- ▶ Positive end-expiratory pressure valve.
- ▶ Inline suction.
- ▶ End-tidal CO<sub>2</sub> monitor tubing.
- ▶ Colorimetric CO<sub>2</sub> detector.
- ▶ ETT viral filter.
- ▶ Glidescope with disposable handle.

##### Intubation kit: outside the patient's room.

- ▶ 6–8.5 mm internal diameter ETTs.
- ▶ Laryngeal mask airway size 4 and 5.
- ▶ Laryngoscope handle.
- ▶ Laryngoscope blades: Miller 3 and Mac 4.
- ▶ ETT cuff manometer.
- ▶ Cricothyrotomy kit.

ETT, endotracheal tube.



**Figure 4** Intubation hood to reduce potential viral exposure while conducting aerosol-generating procedures outside of negative pressure side rooms.

COVID-19 test result for every surgical patient. Therefore, induction of anaesthesia and airway management for non-PUI surgical patients, such as those based at BAF, were conducted in the operating theatre with the AP and assistant wearing full PPE and the remainder of the surgical team waiting outside.<sup>8 9</sup> Tracheal extubation would be undertaken in a similar manner and the theatre emptied for 20 min to allow air to be exchanged in line with the CDC recommendations.<sup>10</sup>

### MANAGEMENT OF THE PUI IN THE PERIOPERATIVE ENVIRONMENT

Anaesthetic and surgical procedures during a viral pandemic are inherently high risk.<sup>9</sup> As the operating theatres were positively pressurised, PUIs and COVID-positive patients would preferentially undergo induction of anaesthesia and airway management in their NPR,<sup>11</sup> using the precautions discussed. Transfer to the operating theatre would then occur with a viral filter in place on the ETT and the patient would then be transitioned onto an anaesthetic machine with a circle system once in the operating theatre, with an additional viral filter placed on the expiratory limb.<sup>12</sup> After ventilation was established on the anaesthetic machine, all theatre personnel would wear standard PPE, unless the patient was confirmed as COVID-positive or the procedure was considered high-risk for aerosolisation, when an N95 mask would be additionally used. Postoperatively the patient was transferred back to their NPR for extubation and recovery.<sup>11</sup>

A designated operating theatre was used for PUIs and COVID-positive cases, with all non-essential equipment and excess inventory stripped out before the patient arrived.<sup>8</sup> Where possible, all necessary anaesthetic drugs were prepared prior to the patient's arrival so that drawers could

remain sealed. Resuscitation drugs were placed in plastic bags within dedicated drawers, allowing easy access in an emergency and reduced contamination. As an additional precaution, drawers were taped shut; if the tape was broken, items within the drawer were considered to be contaminated and either cleaned or removed.

All trauma patients requiring surgical intervention were designated a PUI. Patients identified in the ED as requiring immediate surgical intervention were intubated in the trauma bay by the receiving team. Patients identified as requiring surgery later, for example after CT, were transferred to their NPR for intubation.

### CONCLUSION

RS and the global pandemic are both ongoing; therefore, the epidemiological data on the effect of COVID-19 across the CJOA-A remain operationally sensitive, precluding publication at this time. This paper describes the adaptations made without and within a deployed role 3 facility in order to continue to provide high-quality care to trauma patients with potential concurrent COVID-19 infection. We also highlight the procedures adopted to protect HCWs in a resource-limited deployed environment, without degrading overall medical capability.

As a facility designed and staffed predominately to manage combat trauma, CJTH was in some areas already well positioned to meet the challenge of managing COVID-19 with adaptable, motivated staff and a high proportion of ITU beds. In other areas we have shown that basic alterations to techniques and simple modifications of equipment using kit already present in the operational environment can mitigate the risks of a viral pandemic.

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