

Adding the Capacity for an Intensive Care Unit Dedicated to COVID 19, Preserving the Operational Capability of a French Golden Hour Offset Surgical Team in Sahel

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ABSTRACT

Introduction:

In April 2020, the military medical planning needs to be recalibrated to support the COVID-19 crisis during a large-scale combat operation carried out by the French army in Sahel.

Material and Methods:

Since 2019, proper positioning of Forward Surgical Teams (FSTs) has been imperative in peer-to-peer conflict and led to the development of a far-forward surgical asset: The Golden Hour Offset Surgical Team (GHOST). Dedicated to damage control surgery close to combat, GHOST made the FST aero-mobile again, with a light logistical footprint and a fast setting. On 19 and 25 March 2020, Niger and Mali confirmed their first COVID-19 cases, respectively. The pandemic was ongoing in Sahel, where 5,100 French soldiers were deployed in the Barkhane Operation.

Results:

For the first time, the FST had to provide, continuously, both COVID critical care and surgical support to the ongoing operation in Liptako. Its deployment on a Main Operating Base had to be rethought on Niamey, to face the COVID crisis and support ongoing operations. This far-forward surgical asset, embedded with a doctrinal Role-1, sat up a 4-bed COVID intensive care unit while maintaining a casualty surgical care capacity. A COVID training package has been developed to prepare the FST for this innovative employment. This far-forward surgical asset was designed to support a COVID-19 intensive care unit before evacuation, preserving forward surgical capability for battalion combat teams.

Conclusion:

Far-forward surgical assets like GHOST have demonstrated their mobility and effectiveness in a casualty care system and could be adapted as critical care facilities to respond to the COVID crisis in wartime.

INTRODUCTION

Since 2013, France is engaged in a large-scale combat operation in Mali following Resolution 2085 of the Security Council of the United Nations. In April 2020, more than 5,000 French soldiers were fighting against armed terrorist groups alongside the Malian National Army and the African Armed Forces. On March 19 and 25, 2020, Niger and Mali confirmed their first COVID-19 cases, respectively. The pan-

demic was ongoing in Sahel.¹⁻³ Engaged in France to face the epidemic, The French Military Health Service had to plan the COVID care and evacuation in Sahel. For the first time, the Forward Surgical Team (FST) had to provide, continuously, both COVID critical care and surgical support to the ongoing operation in Liptako. Supporting a large-scale combat operation in Sahel since 2013, the employment of surgical assets evolved in order to respond to the Golden hour paradigm. In 2018, a Golden Hour Offset Surgical Team (GHOST) was created to make the FST mobile again, staged on the Forward Operating Base and dedicated to Damage Control Surgery.⁴ The innovative deployment of a GHOST in order to achieve a dual mission during the COVID-19 crisis is presented here, as it was deployed in Niamey, Niger, on April 1, 2020. The GHOST had to support the Role 1 in Niamey Operational Airbase whose medical officers were in charge to make public health recommendations to the troops that it supported: hand hygiene, social distancing, environmental cleaning, cough etiquette, and active case finding. The medical staff of the GHOST was dedicated to medical treatment of COVID patients. This far-forward surgical asset was designed to support a COVID-19 intensive care unit before evacuation, preserving forward surgical capability for battalion combat teams.

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THE FRENCH GOLDEN HOUR OFFSET SURGICAL TEAM

Doctrine

The large-scale combat operation carried out by French armies in Sahel required a revision of the military medical planning and the development of mobile far-forward surgical assets. The French GHOST was designed in response to the French casualty care system's need for forward non-fixed surgical capability. Dedicated to damage control surgery close to combat, GHOST made the FST aero-mobile again, with a light logistical footprint and a rapidly deployable surgical capacity. Those characteristics allowed its positioning within an area of operation characterized by constantly evolving operational risk and priorities. Commonly fielded in area-support postures in close proximity to the combat, this 12-person team was aimed to conduct expert far-forward triage and execute early stabilizing interventions using Damage Control Surgery principles before tactical evacuation: sort, fix, and pack!⁵⁻⁷ Supporting a battalion operational area, the GHOST could simultaneously manage four wounded-in-action and two seriously injured patients. In 18 months, its mobility and capacity for fast deployment has been demonstrated 13 times, on 4 Forward Operating Bases in Mali and Niger.

Far-Forward Surgical Asset

To ensure mobility, 18 airborne boxes from the Surgical Life-Saving Module⁸ (SLM) contain surgical equipment; temperature-controlled storage of blood products; and medical supplies. The logistical footprint of the GHOST was 3,7 T of equipment. Both material and personnel were transported from a Forward Operating Base in Mali to the Main Operating Base of Niamey, Niger, in one C-160 TRANSALL. This far-forward surgical asset was composed of a Shock Room and an Operating Room sheltered in two U.S. tents (Fig. 1). Embedding with a Role-1 adds additional depth for massive casualties while maintaining control of evacuation on the Forward Operating Base. The resupply of the GHOST was delivered through the logistical chain of the supported unit or through incoming MEDEVAC platforms. It required a Role 2 facility, sat on a Main Operating Base in Gao, Mali, for sterilization of surgical equipment and temperature-controlled storage of blood products.

Surgical Team

The GHOST was different from a classic French FST because of the lightened equipment, but the team composition was the same (Table S1). A French FST^{9,10} could be summarized as a Shock Room Team and an Operating Room Team. An anesthetist, two critical care nurses, two medics, and one administrator were listed in the first team, and two surgeons, a surgical technician, a medic, and two anesthetic nurses in the second. A basic medical training based on the Advanced Trauma Life Support, the French Advanced Course



FIGURE 1. French Golden Hour Offset Surgical Team: the Shock Room and the Operating Room in the background.

for Deployment Surgery¹¹, and the Advanced Trauma Course for Nurses had to be completed. A military training dedicated to the GHOST setting was delivered to the FST.

ADDITIONAL COVID UNIT

Because of the need of an intensive care unit (ICU) capacity before evacuation, preserving operational capability of the GHOST, we developed a separate area dedicated to COVID with the addition of limited material from the SLM already stored in theater, based on French experience of resuscitation in austere settings (Fig. 2).^{12,13}

Critical Care Unit

The critical care unit included: ICU and intermediate care beds (IMCU). We had defined ICU beds as those dedicated to ventilatory supported patients needing ventilators protected by two filters, an oxygen concentrator, monitor, and five syringe pumps (Fig. 3).

IMCU beds were designed for oxygen-dependent patients requiring close monitoring. Doctrinally, there were only three ICU beds in the GHOST's equipment, dedicated to surgical support of ongoing operations. The FST used supplementary SLM equipment, that is, French Special Operations Surgical Team (SOST), in order to enforce a dedicated COVID critical care unit which could be modulated into either a four ICU bed ward, or a two ICU bed and four IMCU bed ward. This SLM was already stored in the operating theater. Four nurse-medic duos can be involved in COVID patient care activities. A special drug supply has been estimated and delivered to the GHOST in order to support a critical care capacity of 4 ICU beds over 48 hours. Moreover sat on a military Airbase in Niamey, the oxygen capabilities could be expanding using aviation oxygen that provided a huge resource.

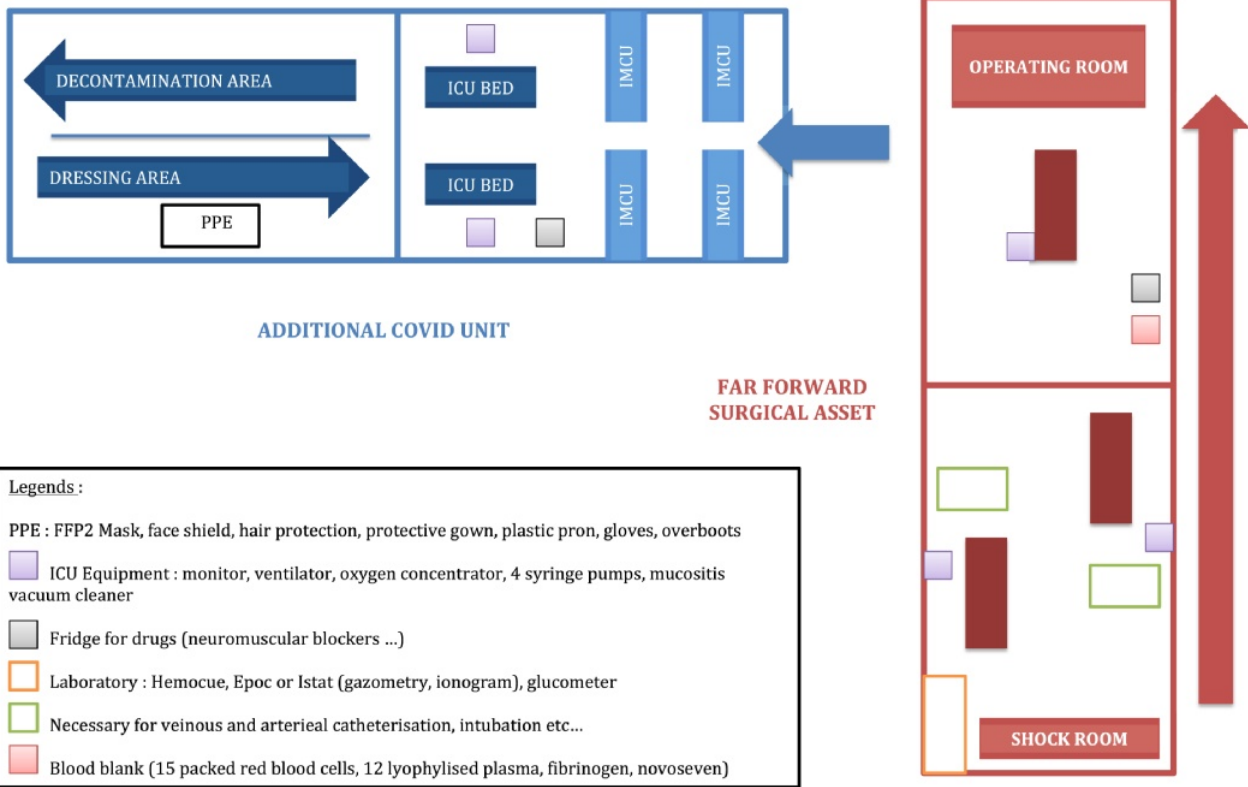


FIGURE 2. GHOST with “COVID extension” plan. The two units are completely separated.



FIGURE 3. An improvised COVID critical care unit in austere setting: two beds of intensive care.



FIGURE 4. An improvised COVID critical care unit in austere setting: dressing area (according to the principles of chemical, biological, radiological, and nuclear defense).

Decontamination Area

In accordance with CBRN defense (chemical, biological, radiological, and nuclear defense), principles of the military medical team response to a chemical warfare attack were applied in the decontamination area (Fig. 4).¹⁴ The tent for the decontamination area was divided into dirty and clean sides. The concept was to keep all contaminated equipment,

personnel, and casualties out of the clean side until decontamination was completed. The dirty side consisted of the COVID critical care unit and the decontamination area. In the clean side, personnel were permitted to wear the Personal Protective Equipment (PPE) needed to correctly protect oneself. Based on the WHO recommendation, PPE for the care of COVID patients were CONTACT and AIRBORNE

precautions (hence, a respirator mask such as FFP2). A specific supply in PPE and drugs had been reached based on a scenario of sustaining 2% of severe COVID patients during 48 hours before Strategic Evacuation (STRATEVAC). Only clinical staffs that were trained and competent in the use of PPE were allowed to get in the COVID unit. The triage station was sustained by the Role-1 facility. Caregivers who were leaving the COVID critical care unit were decontaminated on the dirty side. COVID patients were transferred through a dedicated entrance in the critical care unit.

On-Theater COVID-19 Training

Dedicated to damage control surgery, the FST had to be trained in Severe Acute Respiratory Infection Treatment. Inspired by WHO online training, a specific training package had been developed to meet the operational needs emerging with the COVID-19 pandemic. It provided a thorough understanding of the principles of a multimodal strategy of management of COVID-19 patients. Basic skills were taught, dealing with wearing PPE, Acute Respiratory Distress Syndrome nursing, ventilatory support, and sonography for COVID. The clinical staff received an advanced training on deep-breathing exercises based on relaxation techniques developed for soldiers and pilots.

Evacuation

The GHOST has been deployed in the Niamey Main Operation Base, close to Niamey International Airport, to support all French Forces deployed in Niger and Mali as a far-forward surgical asset and critical care facility. Attributable to this geographical location, the GHOST could act as a gate to STRATEVAC for at-risk or severe COVID patients. STRATEVAC standard of care should be to limit SARS-CoV-2 dissemination and used specific device as bubble for high risk contaminated patient associated with protocol of decontamination for the airplane.

CONCLUSION

Operational needed emerging with the COVID pandemic have led to a non-doctrinal employment of military surgical facilities. Attributable to its mobility, the French GHOST has been an interesting option to support an effective critical care unit before evacuation. Engaged for at-risk or seriously ill COVID patients, this far-forward surgical element has required substantial revisions: the FST must have been trained to specific COVID critical care, and a special supplemental supply has been necessary.

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DISCLAIMER

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