

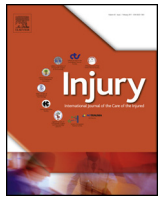


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Original article

## Forward medevac during Serval and Barkhane operations in Sahel: A registry study

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### ARTICLE INFO

#### Keywords:

Forward MEDEVAC  
Trauma  
Joint trauma system  
Combat  
French military  
FLYP  
PECC

### ABSTRACT

**Introduction:** The French army has been deployed in Mali since January 2013 with the Serval Operation and since July 2014 in the Sahel-Saharan Strip (SSS) with the Barkhane Operation where the distances (up to 1100 km) can be very long. French Military Medical Service deploys an inclusive chain from the point of injury (POI) to hospital in France. A patient evacuation coordination cell (PECC) has been deployed since February 2013 to organise forward medical evacuation (MEDEVAC) in the area between the POI and three forward surgical units.

The purpose of this work was to study the medical evacuation length and duration between the call for Medevac location accidents and forward surgical units (role 2) throughout the five million square kilometers French joint operation area.

**Materials and methods:** Our retrospective study concerns the French patients evacuated by MEDEVAC from February 2013 to July 2016. The PECC register was analysed for patients' characteristics, NATO categorisation of gravity (Alpha, Bravo or Charlie who must be respectively at hospital facility within 90 min, 4 h or 24 h), medical motive for MEDEVAC and the time line of each MEDEVAC (from operational commander request to entrance in role 2).

**Results:** A total of 1273 French military were evacuated from February to 2013 to July 2016; 533 forward MEDEVAC were analysed. 12,4% were Alpha, 28,1% Bravo, 59,5% Charlie. War-related injury represented 18,2% of MEDEVAC. The median time for Alpha category MEDEVAC patients was 145 min [100–251], for Bravo category patients 205 min [125–273] and 310 min [156–669] for Charlie. The median distance from the point of injury to role 2 was 126 km [90–285] for Alpha patients, 290 km [120–455] km for Bravo and 290 km [105–455] for Charlie.

**Conclusions:** Patient evacuation in such a large area is a logistic and human challenge. Despite this, Bravo and Charlie patients were evacuated in NATO recommended time frame. However, due to distance, Alpha patients time frame was longer than this recommended by NATO organisation. That's where French doctrine with forward medical teams embedded in the platoons is relevant to mitigate this distance and time frame challenge.

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## Introduction

The French Army has been deployed since February 2013 in Sahel (Serval operation and Barkhane operation). The joint operation area (JOA) is a five million square kilometer area and encompasses five countries (Mauritania, Mali, Burkina Faso, Niger and Chad).

The French Military Medical Service (FMMS) implements an inclusive chain from the point of injury (POI) to hospital in France [1]. In contrast to many nations, the French Military doctrine is to place military health care providers as far forward in the battle space as possible [2]. Based on the North Atlantic Treaty Organisation (NATO) recommendations [3], the French Military Medical Service has been organised into four levels of care: Role 1 representing the medical teams deployed with the combatants (a doctor, a nurse and five paramedics), Role 2 constitutes forward surgical unit (FSU), Role 3 representing the combat support hospital and Role 4 being the military teaching hospital in France.

In the Sahel-Saharan strip (SSS), the FMMS has deployed forward surgical units. These structures are composed of one general surgeon, one orthopedic surgeon, one anesthetist, two anesthetist nurses, one operating room nurse, two critical care nurses, one executive officer and three emergency medical technicians. Its role is to perform damage control surgery on war-wounded soldiers before early evacuation (<24 h) to teaching military hospital in France (Fig. 1).

The MEDEVAC helicopter team is composed of a doctor and a nurse and they perform the forward MEDEVAC from the battlefield to the role 2 (range of action inferior than 250 km). A doctor, a flight nurse and a nurse compose the MEDEVAC aircraft team. They can bring up to eight patients.

Treatment time frame of battlefield injuries and time frame to access to surgical facilities are critical for the patient and have an impact on the outcome [4]. Battlefield injuries are responsible for massive haemorrhage, and health service organisation has to bring the soldier as fast as possible to a surgical unit to stop the bleeding.

This time frame has been described as the “golden hour” during Afghanistan and Iraq wars [5].

As the JOA in Sahel is large, evacuations helicopters and aircraft are the main assets planned by FMMS. In order to plan, coordinate and perform these evacuations, a Patient Evacuation Coordination Center (one flight surgeon and one secretary) has been implemented. Due to the extended range of the JOA, air evacuations (combining helicopters and planes) are the obvious and preferred course of action.

The objective of this study was to characterise elongation and duration of the MEDEVAC during the French army operations Serval and Barkhane since February 2013 to July 2016.

## Material and methods

### Study design

A retrospective review of the data collected by the patient evacuation coordination cell (PECC) for all MEDEVAC between February 2013 to July 2016 was conducted. The PECC registry is a Microsoft Excel<sup>®</sup> database.

### Inclusion and exclusion criteria

We included all the French soldiers who needed an evacuation by medical air assets between the point of injury (POI) to a role 2 and regulated by the PECC.

### Data collected

Data retrieved from the PECC database included age, sex, medical diagnosis, NATO emergency categorisation, localisation of POI, role 2 and aircraft used for the MEDEVAC, the time-line of each MEDEVAC (transmission of the “9-line request” at the operational center, takeoff, arrival on the POI of the MEDEVAC team and patient admission in the role 2). The “9-line request” is a military, pragmatic and tactical message. It includes the number and the

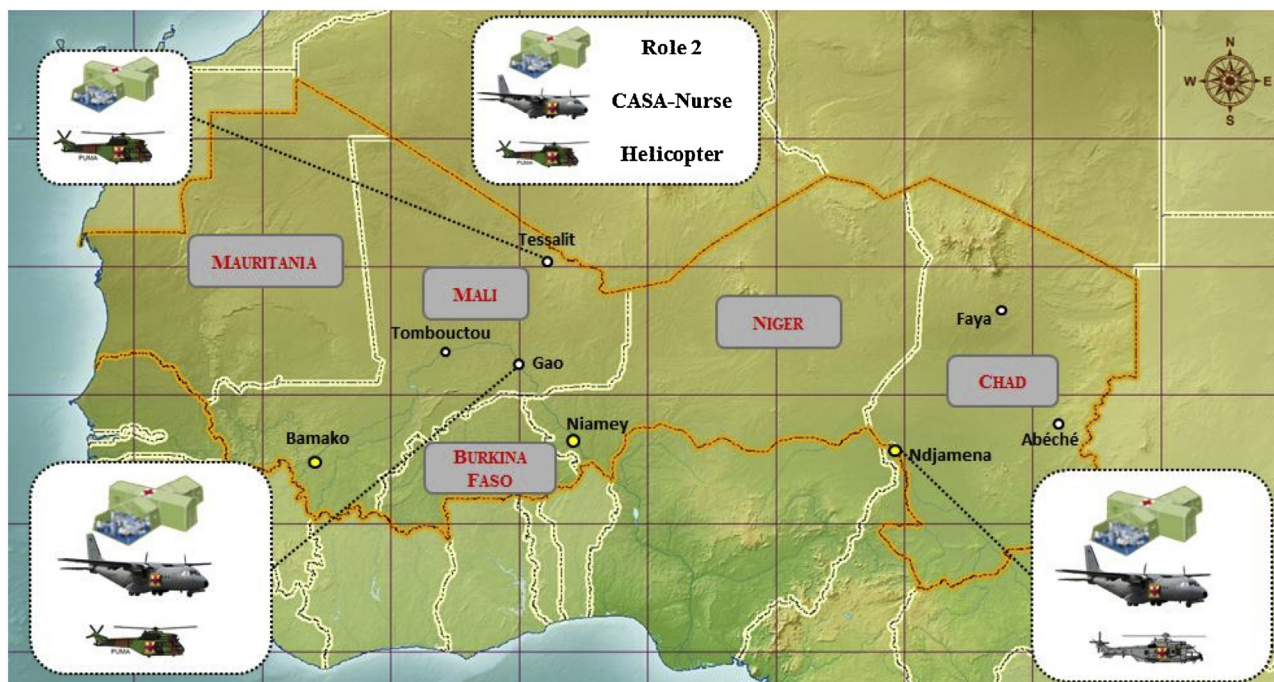


Fig. 1. French Health Medical Service organisation in the Sahel-Saharan Strip.

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