

Mass burn casualty incidents

Draft EBA guidelines for transportation of patients

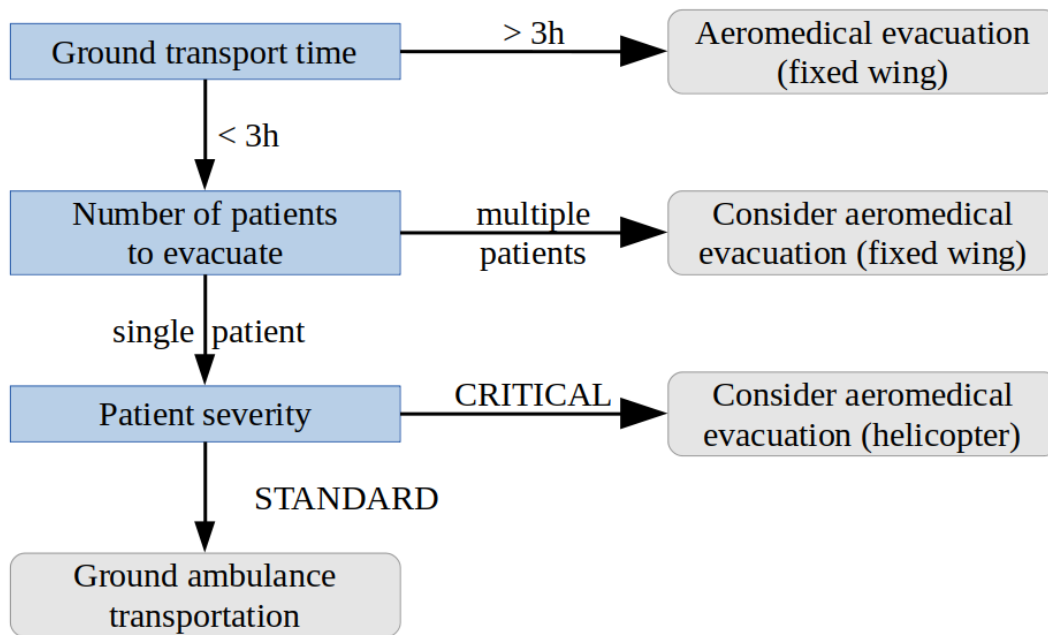
The following guidelines address medical evacuations (MEDEVAC) of multiple burned patients in a situation of mass burn casualty incident (MBCI), as part of the European MBCI response plan, with a special focus on aeromedical evacuations.

1 Patient selection, care level and time frame

- The selection and prioritization of patients for MEDEVAC should be based on the recommendations of Burn Assessment Teams.
- The required level of *en route* care is defined as follows:
 - **critical** for critically ill patients already undergoing intensive supportive treatment, or for less severe patients yet with a significant risk of severe *en route* decompensation;
 - **standard** for patients with a low probability of severe *en route* complication.
- Provided adequate initial care, burned patients should be best transported after stabilization of initial burn shock, if any, and before occurrence of severe secondary complications.
- MEDEVAC to foreign burn centres should occur before H96 (practically from H48 to H96).

2 Transport mode

- The following transport modes, or *vectors*, should be considered: ground ambulance, helicopter, or fixed wing aircraft for individual or collective patient evacuation.
- The MEDEVAC vector should be selected based on distance / travel time, number and severity of patients, and complexity of the MEDEVAC implementation. The following algorithm is suggested as a tool to guide the decision.



- Whenever applicable, equal attention should be paid to the three phases of patient transportation: upstream small loop, main loop, and downstream small loop.
- Roles and responsibilities in the MEDEVAC chain should be clearly defined for the country affected by the mass burn casualty incident and for countries that contribute MEDEVAC assets.

3 MEDEVAC teams and assets

In the absence of other identified international MEDEVAC guidelines, the composition of transporting healthcare teams and the medical equipment and supplies for *aeromedical* evacuations should comply with following standards, according to patient care level.

The same recommendations are applicable to ground transportation, except for the specific requirements for air transportation training & safety regulations.

3.1 Critical patients

- The transporting team should be composed as follows (*ICM*: intensive care medicine – *A*: anaesthesiology – *EM*: emergency medicine).

Single patient transportation	Multiple patient transportation
<ul style="list-style-type: none"> • 1 physician – ICM, A or EM specialist • 1 nurse – ICM, A or EM trained 	<ul style="list-style-type: none"> • 1 physician – ICM or A specialist (at best with burn training and experience) → <i>medical mission director</i> • 1 nurse – ICM or A trained → <i>coordinating nurse</i> • 1 physician – EM, ICM or A trained / every 4 patients

	<ul style="list-style-type: none"> • 1 nurse – EM, ICM or A trained / every 2 patients
<ul style="list-style-type: none"> • All should be trained and experienced in air transportation of critically ill patients. • For the transportation of children, the team should also be trained and experienced in the care of critically ill paediatric patients. If such teams are too scarce, non-paediatric teams could manage children above 10 years or above 30 kg, provided that they have suitable equipment, training and experience. • In all cases, training and experience in burn care is beneficial, but not strictly required. 	

- For each patient, the transport kit should include following assets.

Equipment	Supplies
<ul style="list-style-type: none"> • power supply (batteries / mains power) • suction, complete with canulae • oxygen and aerosol delivery devices • manual ventilation (bag / valve / mask) • tracheal intubation kit, complete with rescue devices • mechanical ventilator, complete with tubings and accessories • vascular access & infusion pumps • external warming device • stretcher + bed sore preventing mattress • monitor (cuff & invasive arterial pressure, ECG, SpO2, EtCO2, neuromuscular blockade) • lab exams: blood gases, lactate, haemoglobin, ionogram 	<ul style="list-style-type: none"> • oxygen • IV fluids – lactated Ringer’s, Albumin • hypnotics, opioids and neuromuscular blocking agents; non opioid analgesics • vasopressors • inhaled bronchodilators, mucolytics • heparin, insulin, antibiotics and other medications as appropriate
<ul style="list-style-type: none"> • Paediatric equipment and supplies are required for the transportation of children. • Pre-assembled kits with supplies for at least 8h are advisable. • Proper integration with the evacuation vector should be sought, and compliance with international air transport safety regulations should be ensured. 	

- IV fluids should be carried according to maximal estimated fluid requirements.

- In young children, in the absence of specific paediatric IV fluids, lactated Ringer's supplemented with dextrose (targeting 1% w/v) should be used to prevent hypoglycemia.

3.2 **Standard patients**

- The transporting team should ensure the level of care of a medical / surgical hospital ward.
- Healthcare professionals should also have adequate training and experience in air transportation of patients and acute management of medical emergencies.
- For each patient, the transport kit should include following assets.

Equipment & supplies
<ul style="list-style-type: none"> • oxygen and aerosol delivery • IV access & fluids (supplemental hydration) • external warming device • analgesia, thrombo-embolic prophylaxis and other medications as appropriate

- A complete emergency kit, with similar composition as for a critical patient, should be available. In case of a collective evacuation, at least one emergency kit should be available for a maximum of 10 standard patients.

4 **Preparation and pre-boarding checks**

Mission, equipment, supplies and patient preparation should be checked before boarding, advisably using the 3-step checklist provided below (doc. 1).

5 **En route care**

Continuity of care should be ensured during the whole transportation process, including upstream and downstream small loops if any, following EBA clinical practice guidelines for the management of burned patients.

Special attention should also be paid to following supplementary points.

- All tubes or cannulae should be securely fastened or sutured to the patient, and narrowly monitored all along evacuation.
- Mechanical ventilation, if any, should be optimized with proper corrections for altitude hypoxia / hypobaria. Appropriate adjunctive therapies of smoke inhalation injury, if appropriate, should not be interrupted.
- Hygiene precautions should be ensured at all time during MEDEVAC.
- Patient monitoring and treatment should be precisely documented through a detailed burn resuscitation flow-sheet, advisably using the one proposed below (doc. 2).

Document 1: Pre-boarding preparation check-list

All relevant items in steps 1 and 3 must be checked. Data in step 2 must be available, and suitability for transportation must be confirmed. *In italics: essential items for burned patients.*
(adapted from Leclerc T et al., *Ann Burns Fire Dis* 2015; 28: 57-66)

1) Equipment and supplies – mostly checked before inbound flight

- Usual equipment for aeromedical evacuation, complete, verified and functional
- *Infusion pumps (at least 2), electrical syringe pumps (at least 4)*
- *Conventional ventilator sufficient ; if not, trained personnel and complete functional equipment*
- *Lactated Ringer (+ dextrose for children) : maximum foreseeable volume*
- *Albumin : maximum foreseeable volume*
- Other fluids
- Oxygen : maximum foreseeable consumption
- Catecholamines (at least norepinephrine & epinephrine)
- Current anti-microbial treatments

2) Patient medical data – *updated burn assessment sheet = minimal required data set*

- Identity, contact (family, next of kin)
- Location and time of arrival confirmed by receiving team or DG-ECHO / ERCC
- Medical and surgical history
- *Date and time of burns, TBSA, location of burns (Lund & Browder chart), photographs, circumferential 3rd degree & location, escharotomies already performed*
- *Inhalation injury*
- Associated injuries, urgent surgical procedures already performed
- Infection or colonisation
 - Microbiological results, local/general anti-microbial treatment
 - Isolation if multi-drug resistant bacteria
- Recent evolution
- Ongoing organ failures (N / Y stabilized / Y evolving but transportation OK / Y not transportable)
 - Respiratory – Haemodynamic – Neurological – Renal – Hepatic – Haematologic

CONCLUSION : Patient transportable Y/N

3) Patient preparation

- If spontaneous breathing, confirm absence of indication to intubate
- Endotracheal tube: correctly placed, unobstructed, *securely fastened*; balloon inflated with water
- Pneumothorax: efficient unobstructed drainage, *securely fastened*, Heimlich valve & collector OK
- Mechanical ventilation: adequately set, patient adapted, humidification OK
- *Venous access: reliable, securely fastened*, unobstructed; accessible injection sites
 - Infusion fluids in plastic bag or with altitude air entry; flow checked
- *Arterial access: reliable, securely fastened*, unobstructed; accessible sampling site
 - Arterial pressure tubing compatible with monitor, pressurized without bubble
- *Urinary catheter: correctly placed, unobstructed, with collector graduated for small volumes*
- Gastric tube correctly placed, unobstructed; gravity drainage or mild suction; empty stomach
- Sedation ongoing & adequate
- *Dressing: clean, properly closed, changed less than 24h ago*
- Associated injuries
 - External fixators: visible; protection on pins / wires
 - Surgical incisions & drains: identified, accessible, without active bleeding
- Monitoring: correctly placed & functional
- Thermal protection

