REMOTE
INTERNATIONAL MEETING
HEMS, search and rescue operation

From HEMS to SAR, from sea to mountains, from urban to combat, a thorough Congress. This is Remote.
Operation of aeromedical transportation: biohazard patient

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Overview

• Aeromedical Evacuation

• AE HID Patients
  • Isolation in Flight
  • Medical Management
  • Flight Certification

• Operational Experience

• Lessons Learned
Aeromedical Evacuation (AE)

- AE is the movement of patients under medical supervision by air transport to and between medical treatment facilities as an integral part of the treatment continuum.
Aeromedical Evacuation Issues

• Assessment of the medical benefits for the patient versus the hazards, which might occur in the air
• Flight environment
  – Hypobarism, hypoxia, motion sickness, noise, etc.
• In-flight medical care
• Operational situation and capabilities of the aircraft
• Assessment of contraindications
  – Infectious patients
AE of patients with highly infectious disease

- The outbreak of Ebola Virus Disease (EVD) in West Africa has highlighted questions related to the evacuation of patients with highly infectious diseases (HIDs)

Medical evacuations from EVD-affected countries
- Total: 65
- Europe: 38
- USA: 27
AE of patients with highly infectious disease

• Usually an absolute contraindication for AE
  – AAMedP-1.1 (STANAG 3204)

• Risks
  – Spreading the disease
  – In flight transmission

• Treatment in place
  – Policy most frequently in use
AE of HID patients guidelines

- The use of a **special air transportable isolator** for HID
- Aeromedical Isolation Team
- Not as a routine means of aeromedical evacuation
- Communicable diseases for which high-level containment may be warranted include (Christopher, *Emerg Infect Dis* 1999)
  - Diseases of unknown etiology with a potential for high morbidity and mortality
  - Highly-contagious diseases declared by WHO “PHEIC”: Smallpox, Wild-type Polio, Influenza novel serotype, SARS, etc.
  - Agents requiring BSL-4: smallpox, VHF
Management of patients with highly infectious disease

1) Infection Control

2) In-Flight Patient Care

3) Flight Certification
1) Infection Control in Flight

- Use of Personal Protection Equipment
- Decontamination & cleaning
- Training
- Flight rules according to IHR
- Proper mode of isolation: **closed** vs **open** isolation
Isolation on aircraft

Open Isolation
• The patient and medical staff inside a mobile isolation unit (e.g. tent, container, ambulance), HEPA and negative pressure
• Medical staff protected by PPE
• Enhanced monitoring and treatment interventions
• Highly complex logistics

Closed Isolation
• The patient is placed inside a physical containment: an isolation stretcher (HEPA + negative pressure)
• Medical staff outside without PPE
• Integrated gloves allow some basic patient handling from outside
• Easy to implement
The Aircraft Transit Isolator System

• Two isolators (modular system):
  – STI - Stretcher Transit Isolator: for ambulance
  – ATI - Aircraft Transit Isolator: for aircraft

• Sealed containers in PVC under negative pressure maintained by a battery-powered HEPA-filtered ventilation system

• Easy to implement

• Many monitoring and treatment interventions allowed (i.e. intubation, ventilation, fluids)

• Suitable for different aircraft (C-130J, C-27J, KC-767)
The Aircraft Transit Isolator System Operations

• Patient reception and isolation (ATI or STI)

• Patient transferring (ATI ↔ STI)
Transferring the isolated patient
2) In-Flight Patient Care

- Half suit for patient intubation and airways management to be placed at the entry port

- 4 pairs of gloved sleeves, 2 half suits

- Various sealed cones which may be utilized to pass tubing and wires

Materials required for patient care stored inside: absorbent pads, emesis basins, portable toilet, etc.
Patient with suspect CC-HF intubated and ventilated during an AE in 2007
Isoark N-36 isolator

- To be used on the NATO stretcher
- Envelope in PVC with gloved sleeves
- Negative pressure ventilation system and HEPA filters
- Batteries (10 hrs)
- Height: 52 cm. Length 2 m. Width: 52 cm. Weight 27 kg (without patient)
N-36 → HH-139

- N-36 on stretcher support panel
- N-36 on cabin floor
SCENARIO HH-139

• Patient loading on N-36
• Medical team with PPE

• N-36 decontamination
• Team decontamination and PPE doffing

• N-36 loaded on helicopter
• Medical team and aircrew without PPE
3) Flight Certification

- Whenever a certain modification is needed
  - Military Operational Certification
- The Flight Test Wing has been involved in a series of certifications:
  - ATI and ISOARK N36 onto C-130J aircraft
  - ATI and ISOARK N36 onto C-27J aircraft
  - ISOARK N36 onto, HH-212A, HH-139A helicopters
  - ATI and ISOARK N36 onto B-767A aircraft
3) Flight Certification

• Examples of certification issues:
  • ATI boarding (high loader on KC-767)
  • Restraint device and fastening
  • Power supply, EMC interference
  • Vibration, weight
  • Emergency egress procedures
C-130 J set-up
KC-767 set-up
Operational experience
Operational experience

- 2006
  - 1. AE TBC Sardinia
- 2007
  - 2. AE suspect CCHF Torino
  - 3. AE TBC Sardinia
- 2009
  - 4. AE dengue Torino
- 2010
  - 5. AE TBC Sicily
- 2011
  - 6. AE TBC Sicily
- 2014
  - 7. AE suspect monkeypox Sicily
  - 8. AE EVD Sierra Leone
- 2015
  - 9. AE EVD Sardinia
  - 10. AE TBC Sardinia
  - 11. AE EVD contact Senegal
  - 12. AE Suspect VHF Pantelleria
- 2018
  - 13. AE TBC Sicily
CASE REPORTS

1. Nov 25, 2014 - EVD Patient from Sierra Leone
2. May 12, 2015 - EVD Patient from Sardinia
Nov 25 2014 - EVD Patient from Sierra Leone
May 12, 2015 - EVD Patient from Sardinia
Lessons learned

• ATI in our experience is effective for in-flight patient management and safe for the operators
• AE capability achieved on short (helicopter, C-27) medium (C-130 J) and long range (KC-767)
• Limitations
  • Elevated number of patients
  • High level of care to critical patient for long flight
• AE of patients with HID.s in an effective and safe manner is a challenge requiring a strong background in preparedness, including logistics, procedures and skills
References

- North Atlantic Treaty Organization (NATO) STANAG 3204. Aeromedical Evacuation
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