MINISTÈRE DES ARMÉES
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Service de santé des armées

Human factors in critical situations

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IRBA

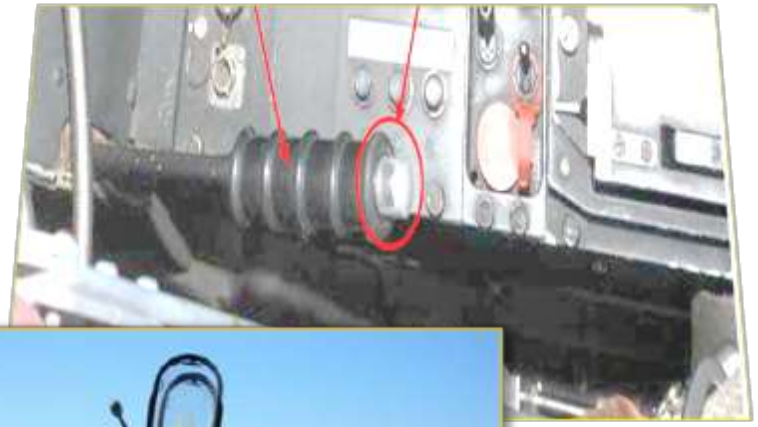
[redacted]

Disclosure slide

I have no actual or potential conflicts of interest
in relation to this presentation

Error & error consequences

Identical human failure (error)



Accidents are not due to error but to context

Credit: BEA-É

Beyond humans as the fallible element

All these activities are **thought, conceived, organized, realized and supervised** by human beings

All successes should be credited to **human factors**

Photo credit: Marine Nationale

Photo credit: Gendarmerie Nationale

Photo credit: NATO

Photo credit: © armée de Terre/Défense

Photo credit: © armée de Terre/Défense

Photo credit: C. Derkenne

Human Factors - HF

Definition - Domains

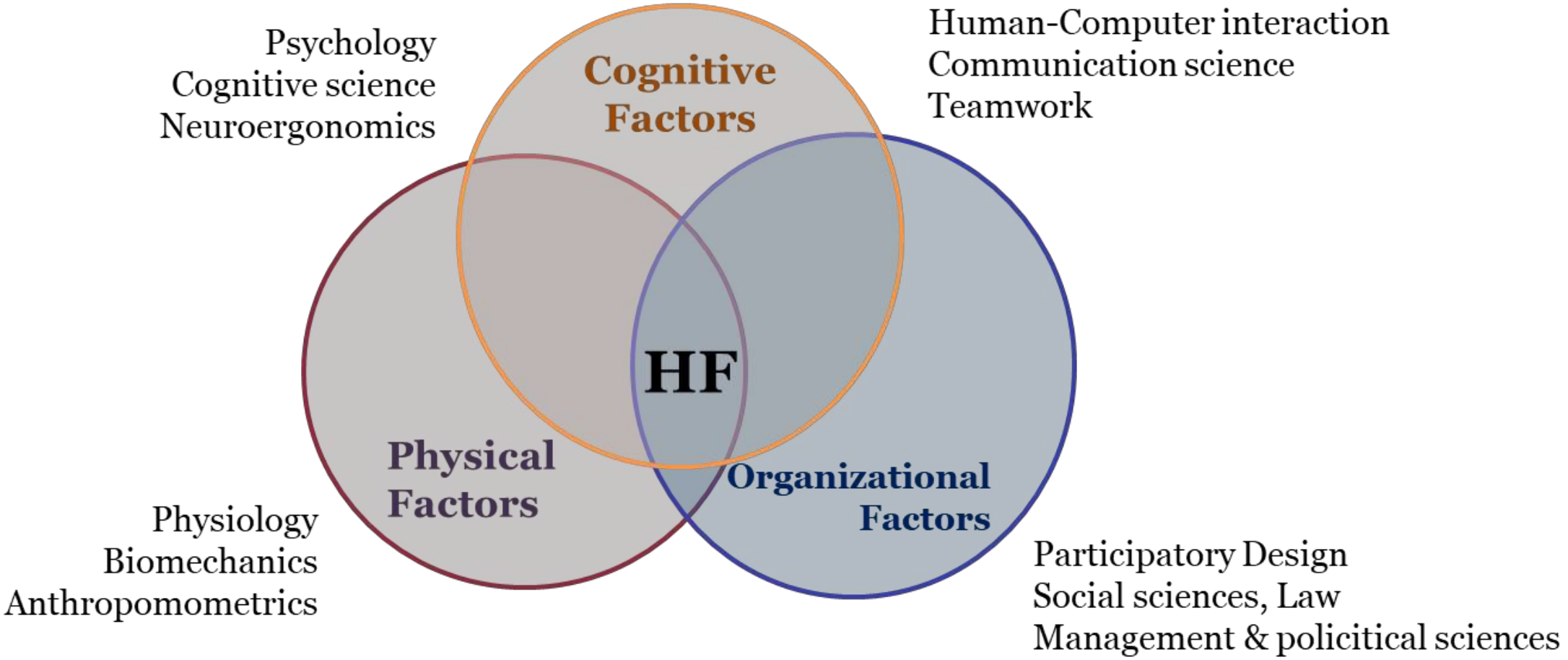
"The **scientific discipline** concerned with **the understanding of interactions among humans and other elements of a system**, and the **profession** that applies theory, principles, data, and methods **to design in order to optimize human well-being** *[including health and safety]* **and overall system performance**."

Credit Karen Arnold
(License: CC0 Public Domain)

International ergonomics association, 2000

Human Factors - HF

Domains



International ergonomics association, 2000

Human Factors | Ergonomics

Understanding Human System Interactions

Function: **to ensure the evacuation of military or other casualties to Role 2**

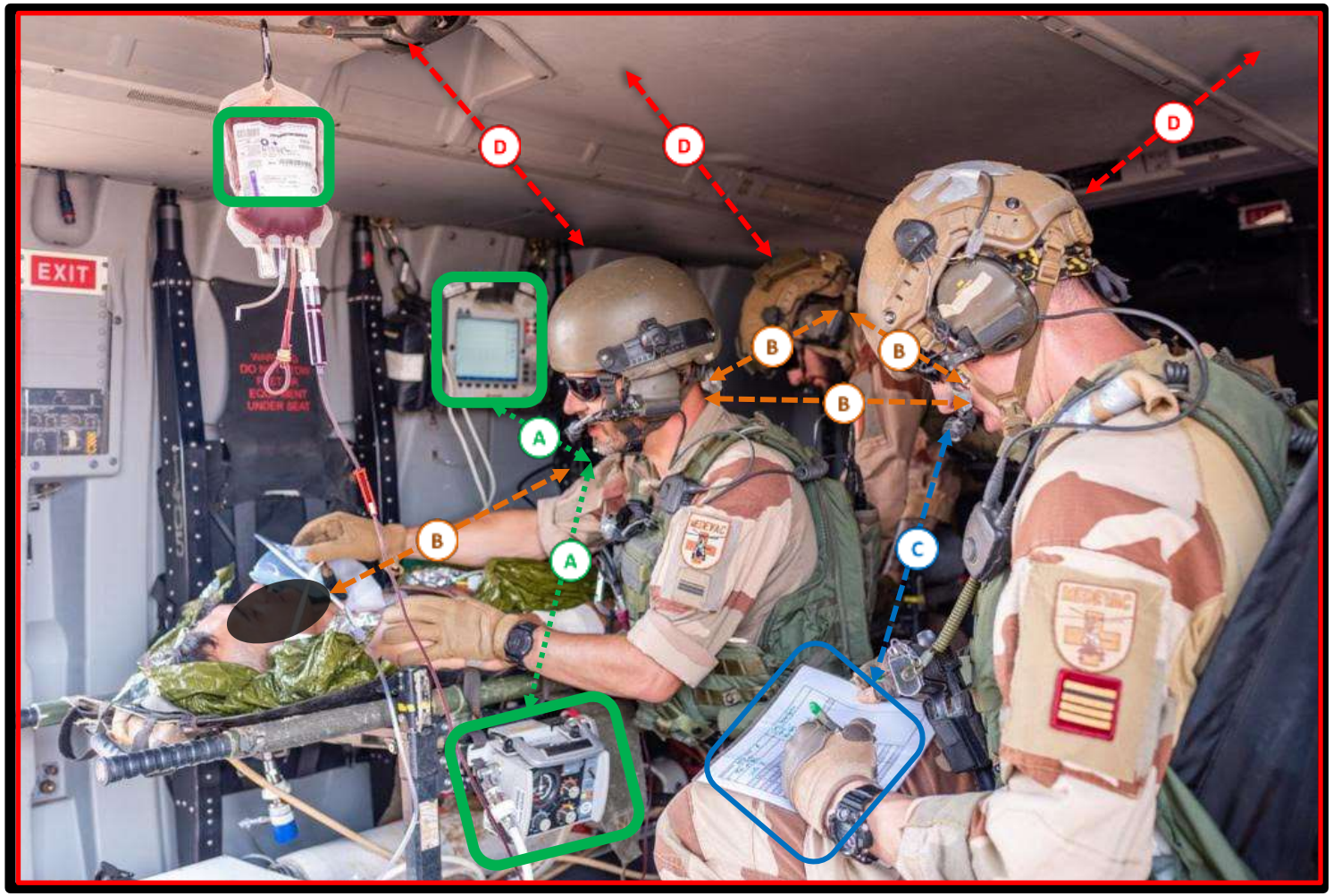


Photo Credit: C. Derkenne

TYPE OF INTERACTIONS

A **Human ↔ Machine**
equipment, materials, interfaces…

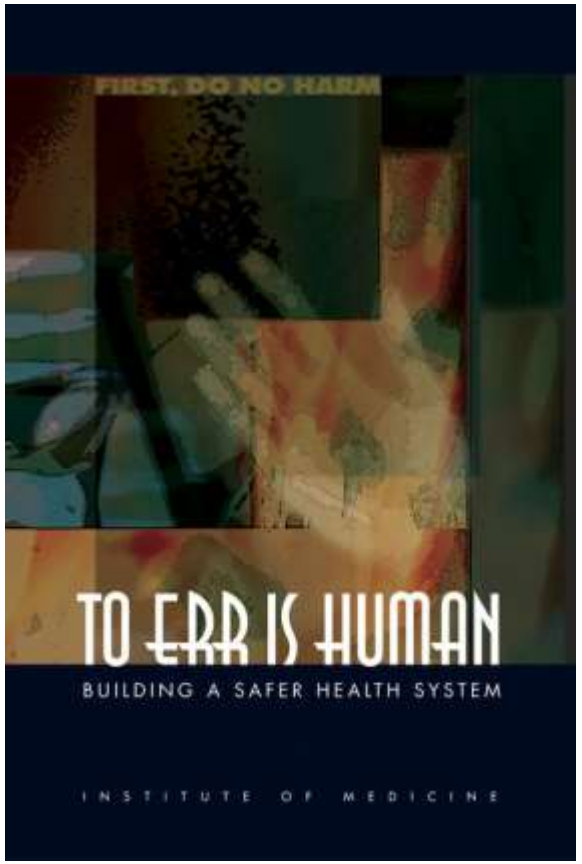
B **Human ↔ Humans**
communication, coordination, teamwork…

C **Human ↔ Rules/procedures**
regulation, guidelines, protocols, checklist…

D **Human ↔ Environment**
physical, social, organisational, cultural…

Human Factors

A growing interest in healthcare since the 2000s



IOM, 1999

World Health Organization | Patient Safety

A World Alliance for Safer Health Care

Credit: WHO

Human Factors in critical situations

Development of guidelines for healthcare professionals and their organizations

Objective

To provide guidelines in the field of Human Factors for the **management of critical situations** by caregivers in healthcare **[an idea box, a toolbox]**

Critical situation in healthcare: any situation with life-threatening for patient(s) and cognition under pressure for caregivers (temporal pressure, complexity, uncertainty…)

Method

- A committee of **19 experts** from SFAR and FHS group learned societies
- **Systematic literature review** and **formulation of recommendations** following the GRADE method (Grading of Recommendations Assessment, Development and Evaluation)
- 4 domains : **Communication**, **Organization**, **Work Environment**, **Education & training**

Human Factors in critical situations

Development of guidelines for healthcare professionals and their organizations

Results

21 recommendations mainly based on non-double-blind randomized studies (moderate and low quality of evidence) and on a **strong agreement between experts**

1. COMMUNICATION

Briefing

Secure communication
(Phraseology, closed-loop communication, speak-up)

Team Debriefing

2. WORK ORGANIZATION

Organization of teamwork

Cognitive aids

Individual & team situation awareness

Safety culture

3. WORK ENVIRONMENT

Materials
(Logical layout, verification, training, usability)

Fatigue & Workload mangement

Work environnent
(noise, psychological)

Task interruption

4. EDUCATION & TRAINING

Stress management

Human factors

HF in critical situations

Area #1 Communication

Before (anticipate): **Team Briefing**

Recommendation. In the context of a critical situation, the experts suggest conducting **a briefing** to improve team performance, improve the safety climate and decrease adverse event rates

Design to prepare teams to cope with the situation: **clear distribution of tasks, role and responsibilities**; **anticipation of scenarios** that could disrupt the completion of the tasks; establish climate and goals

Allow the **pre-activation** of **knowledge** and the ordering of **"mental schemes"**

Avoid the exposure to episodes of **saturation or blockage** of our cognition under stress

Help to develop a **shared situational awareness** and a **shared actions plan**

Reduces uncertainty by making each team members' actions more predictable

Enhance **teamwork**, **communication** and **synergy**

Content and duration adapted to the predictability of the context

HF in critical situations

Area #1 Communication

Before (anticipate): **Team Briefing**

Recommendation. In the context of a critical situation, the experts suggest conducting **a briefing** to improve team performance, improve the safety climate and decrease adverse event rates

Example: TeamSTEPPS® Briefing Checklist

Who is on the team?	☑
All members understand and agree upon goals?	☑
Roles ans responsabilities are understood?	☑
What is our plan of care?	☑
Staff and provider's avaibility throughout the shift?	☑
Workload among team members?	☑
Availability of ressources	☑

HF in critical situations:

Area #1 Communication

During (cope with): **Secured & standardized communication**

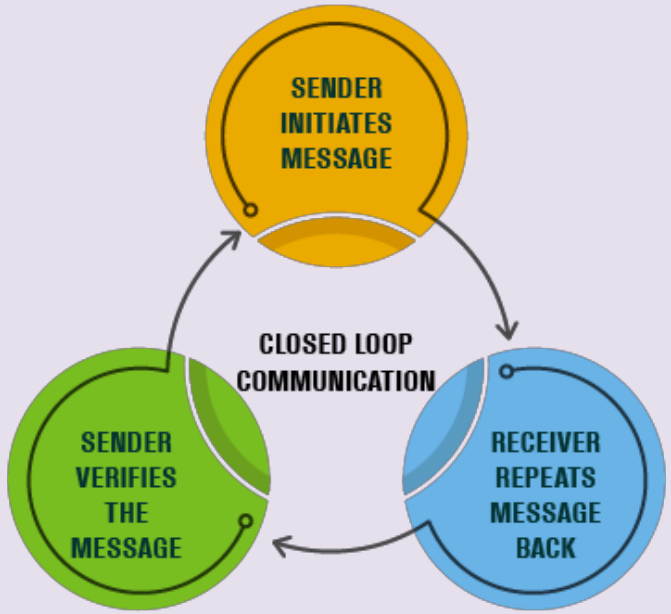
Recommendation. The experts suggest that the healthcare team in crisis situations use **secured and standardized communication** to improve morbimortality and limit the incidence of adverse events

Standard phraseology

Enables us to **communicate effectively** despite differences in language
Reduces the opportunity for **ambiguities /misunderstanding**.

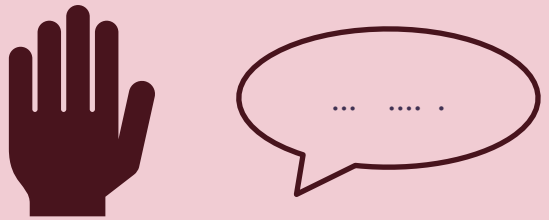
Structure communications to facilitate recall

Closed loop communication for critical information



Credit: American Hospital Association

Speak-Up



Raising a safety issue
Expressing oneself assertively (with confidence, without aggression and without fear)

HF in critical situations

Area #1 Communication

After (learn): **Debriefing**

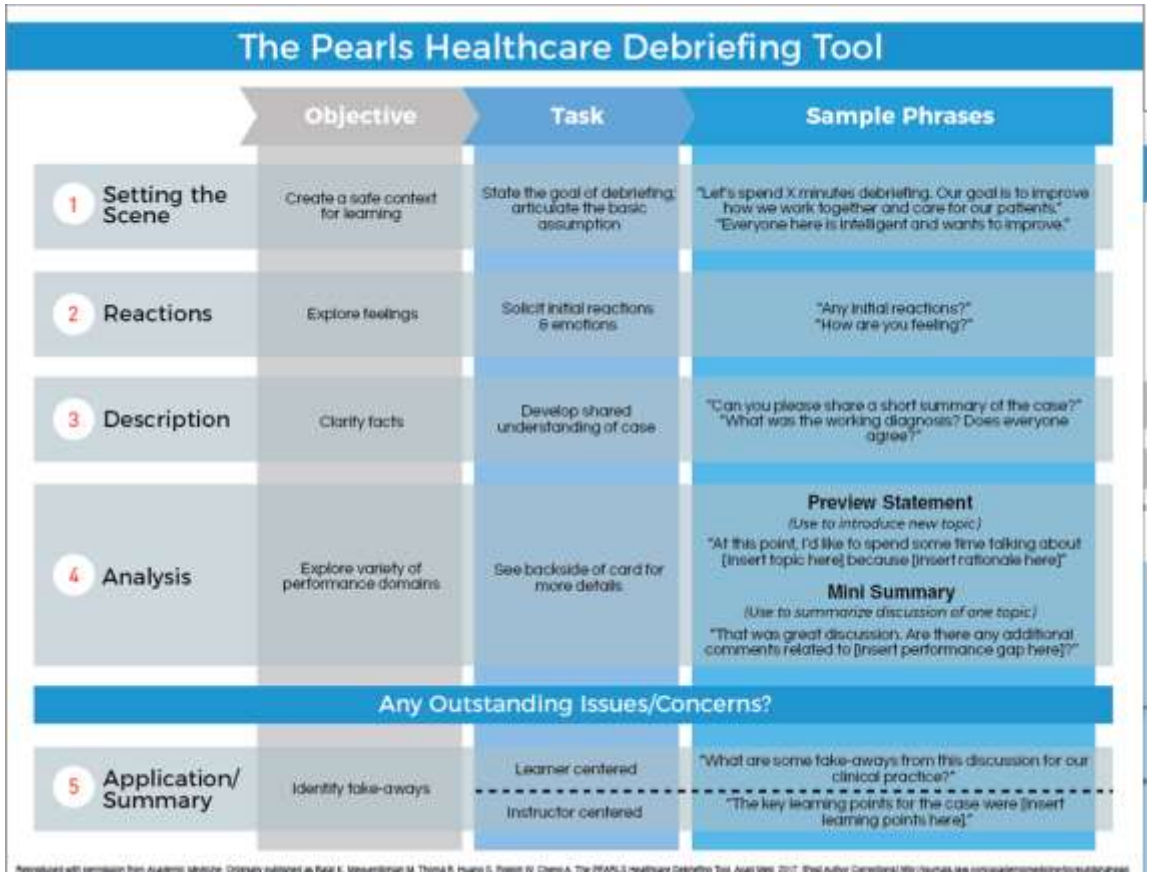
Recommendation. The experts suggest that the **healthcare team** perform a **debriefing immediately after care** in critical situation to improve technical skills and some components of non-technical skills.

Originating from the military and aeronautical sectors

Mainly use in simulation settings (training) in healthcare

Capitalization of experience (**positive and negative**)

Experience as a learning **opportunity** (technical and non-technical skills improvement of team members, organizational learning)



Promoting Excellence and Reflective Learning in Simulation (PEARLS)

Eppich, et al. (2015)

HF in critical situations

Area #2 Organization

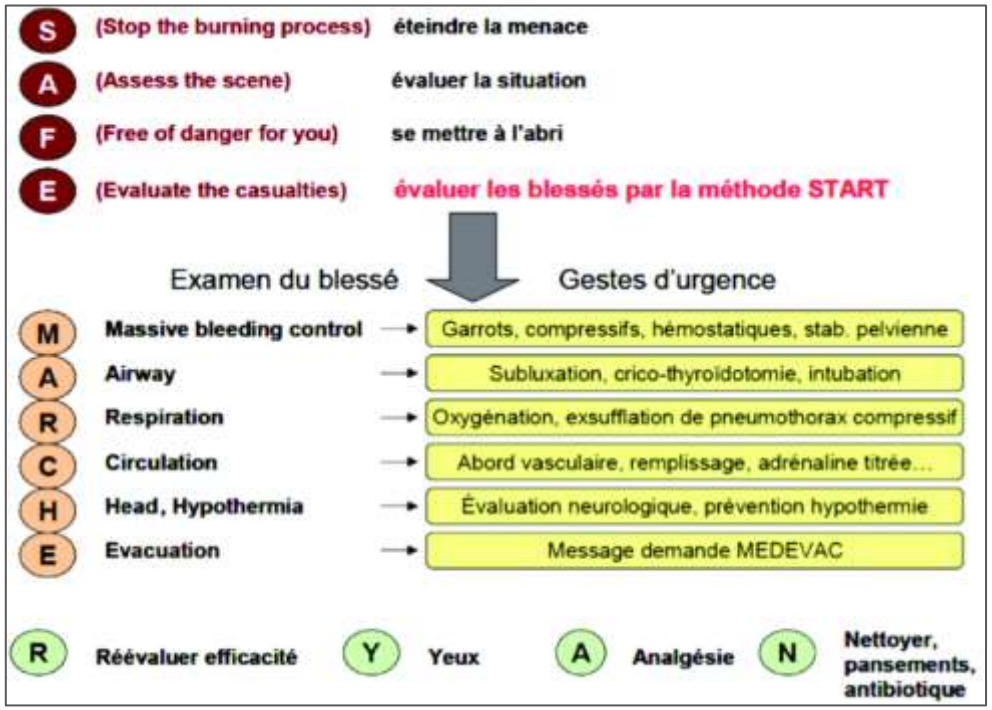
During (cope with): **Check-lists and cognitive aids**

Recommendation. The experts suggest that the healthcare team in a critical situation should use **check-lists and cognitive aids** to improve quality of care and patient safety.

- Help to organize tasks realization and reasoning
- Avoid the exposure to episodes of **saturation or blockage** of our cognition **under stress**
- Provide a safe and effective method (reflect the experience of the organization and previous teams)
- Protect against the limitation of Human operators (development of routines, allow errors detection and recovery before their consequences)
- Optimize effectiveness of teamwork (reduce variability between operators, enhance coordination)

SAFE MARCHE RYAN Acronym

French standardized method for care to war wounded



(Martinez, et al., 2012)

HF in critical situations

Area #4 Education & Training

Recommendation. Experts suggest that health care teams facing critical situations benefit **from psychological preparation for stress management** to improve patient safety and performance

⇒See. *Mental training for stressful situations* | Dr Fabien Ramon

Recommendation. Experts suggest that healthcare teams facing critical situations be **trained in human factors** to improve quality of care and patient safety

Non-technical skills (NTS) are **not innate**

HF education & training improve NTS and patient safety

Mandatory in others high-risk industries

Typical cursus:

- Initial theoretical course
- **Crew Resource Management** (recurrent)
- **Simulation-based training** in HF (recurrent)

Acknowledgments

Link to guidelines

French version (English version coming soon)

https://sfar.org/download/facteurs-humains-en-situations-critiques/?wpdmdl=37888&refresh=635bdf6fcc0131666965359

Human Factors in critical situations

Additional methodological information

Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials

What is already known about this topic

Parachutes are widely used to prevent death and major injury after gravitational challenge

Parachute use is associated with adverse effects due to failure of the intervention and iatrogenic injury

Studies of free fall do not show 100% mortality

What this study adds

No randomised controlled trials of parachute use have been undertaken

The basis for parachute use is purely observational, and its apparent efficacy could potentially be explained by a "healthy cohort" effect

Individuals who insist that all interventions need to be validated by a randomised controlled trial need to come down to earth with a bump

Gordon, et al., BMJ, 2003