

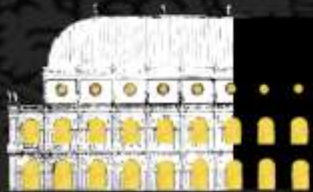
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LA RIVOLUZIONE DEI SISTEMI



Italian
Resuscitation
Council

Le non technical skills in un team di rianimazione

Dott. Lorenzo Gamberini

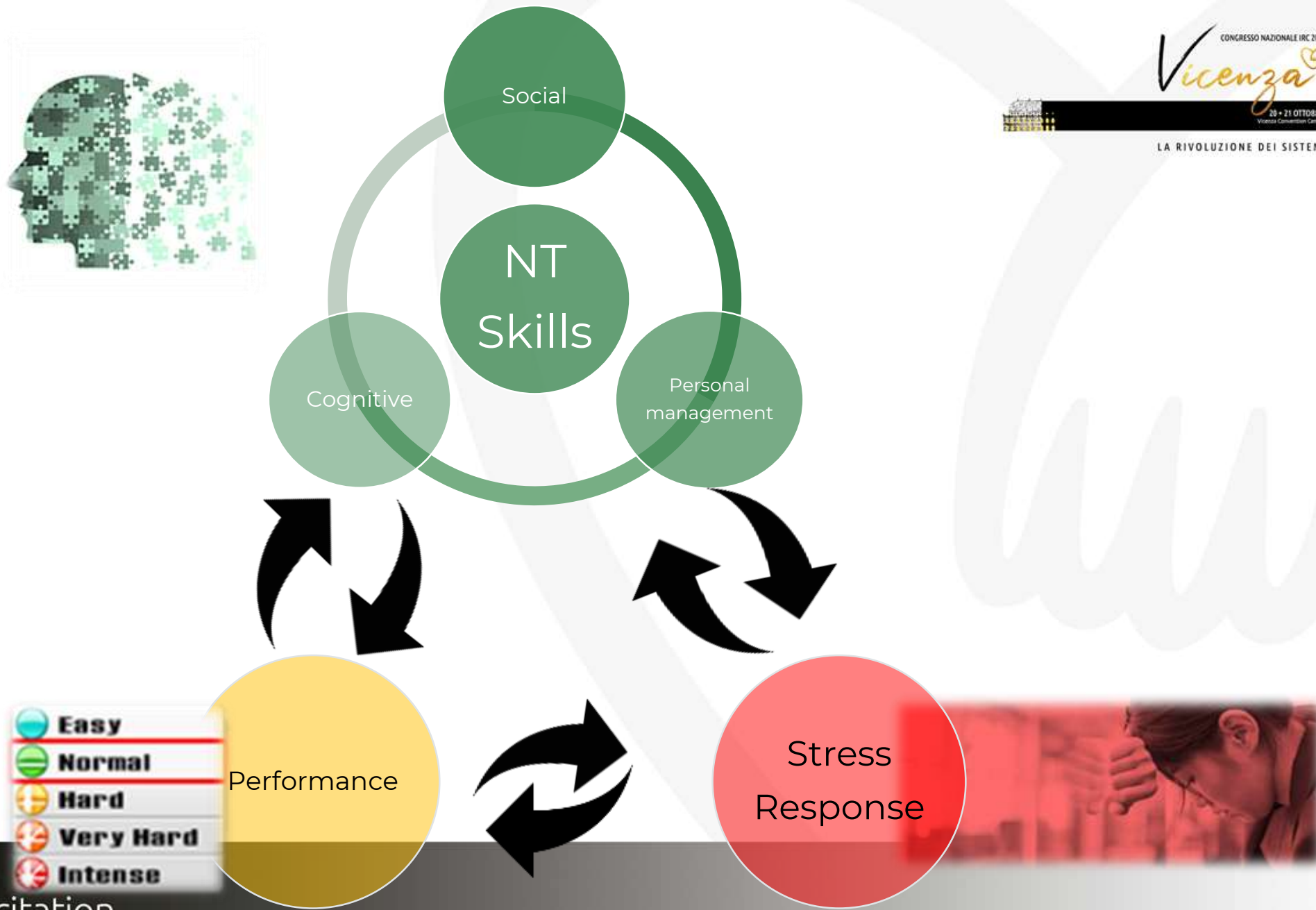
UOC Rianimazione ed Emergenza Territoriale - AUSL Bologna

Synopsis

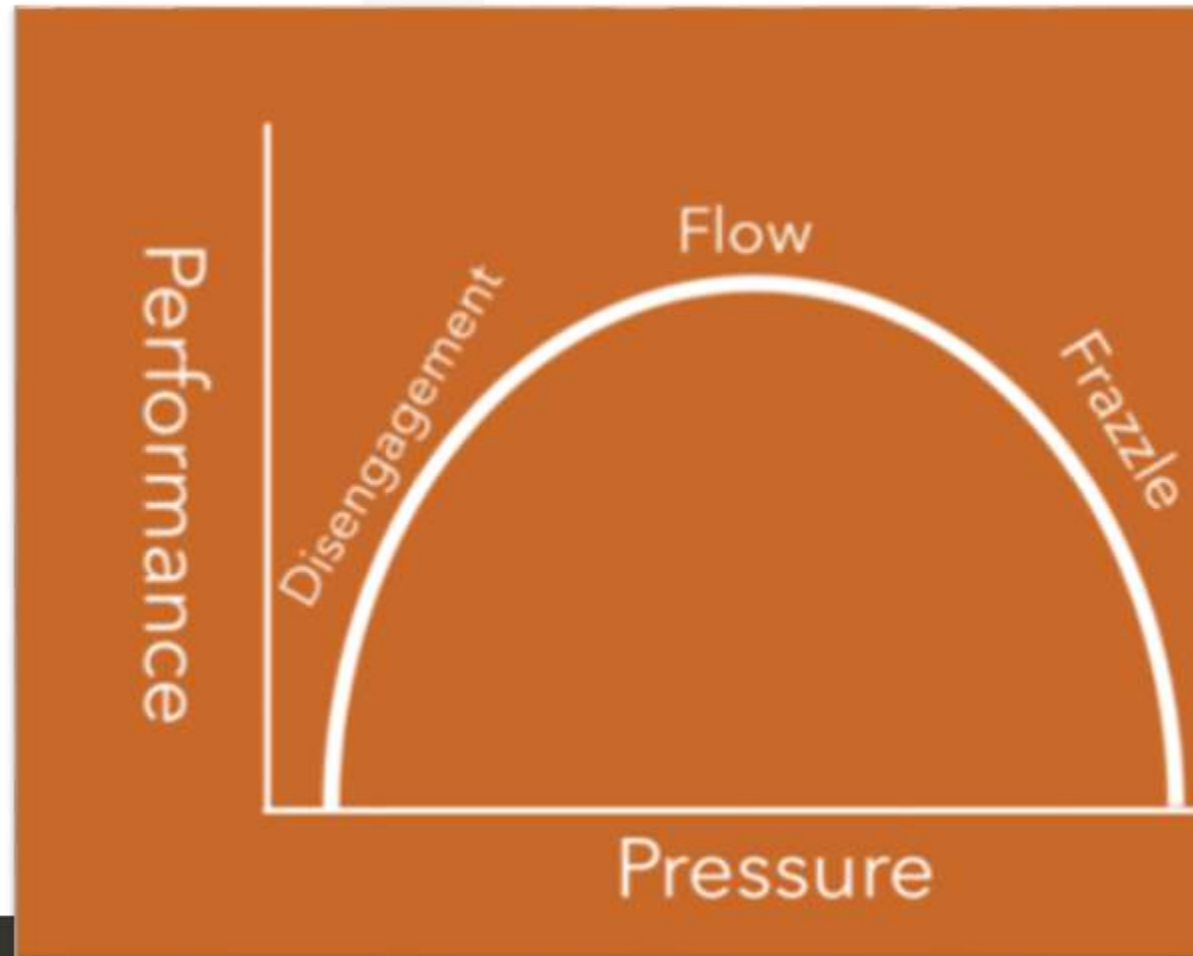
- NTS overview
- Evidence about NTS impact real life
- How to improve NTS
- Take Home Messages



Non-technical skills overview



ARCO DELLA PERFORMANCE



Resuscitation teams

- Variable role, variable personnel
- Variable representation in disciplines and professions
- Intersectoral nature (Nurses, Physicians, Pilots, Technicians, Police, Fire, Lay responders)





**EXAMINING NON-TECHNICAL SKILLS FOR AD HOC RESUSCITATION TEAMS:
A SCOPING REVIEW AND TAXONOMY OF TEAM-RELATED CONCEPTS**

J. Colin Evans, M.D.; M. Blair Evans, PhD; Meagan Slack, MS; Michael Peddle, M.D.; Lorelei Lingard, PhD

BACKGROUND

Non-technical skills (NTS) concepts from high-risk industries such as aviation have been enthusiastically applied to medical teams for decades. Yet it remains unclear whether – and how – these concepts impact resuscitation team performance. In the context of *ad hoc* teams in prehospital, emergency department, and trauma domains, even less is known about their relevance and impact.



SELECTED RESULTS



61 ARTICLES WITH DATA EXTRACTED VIA DESCRIPTIVE ANALYSIS, COHERENCE ANALYSIS, AND CITATION NETWORK ANALYSIS.



INCONSISTENT DEFINITION AND APPLICATION ACROSS 14 NON-TECHNICAL CONSTRUCTS.



LITERATURE BASE THAT IS DISTRIBUTED ACROSS NUMEROUS DOMAINS, RESULTING IN DISCONNECTED AND PARALLEL DISCUSSION.



MEASUREMENT TECHNIQUES THAT FAIL TO CAPTURE ALL ASPECTS OF THE CONSTRUCT BEING INVESTIGATED.



EMERGENCE OF SHARED MENTAL MODELS AND TEAM SITUATIONAL AWARENESS AS TWO CONSTRUCTS THAT ARE OFTEN CONFLATED AND WHICH MAY BE ESSENTIAL TO OUR UNDERSTANDING OF HOW AD HOC RESUSCITATION TEAMS FUNCTION.



LEGEND

Node Colour
(year of publication)
Earliest (1991) =
Most recent (2021) =

Node Size
(number of citations)
Fewest (0) =
Most (11) =

- Leadership
- Communication
- Teamwork
- Briefing/Planning
- Resource management
- Stress and fatigue management
- Followership

- Debriefing
- Decision making
- Situational awareness
- Mental readiness
- Adaptive behaviours
- Shared Mental Model

Evidence about NTS impact real life

Total

2677 incidents
(5610 contributory factors)

2401

Overall, out of 2677 incidents and 5610 total contributory factors, 50% can be attributed to some form of non-technical skill deficit. These figures do not include one study²⁴ which

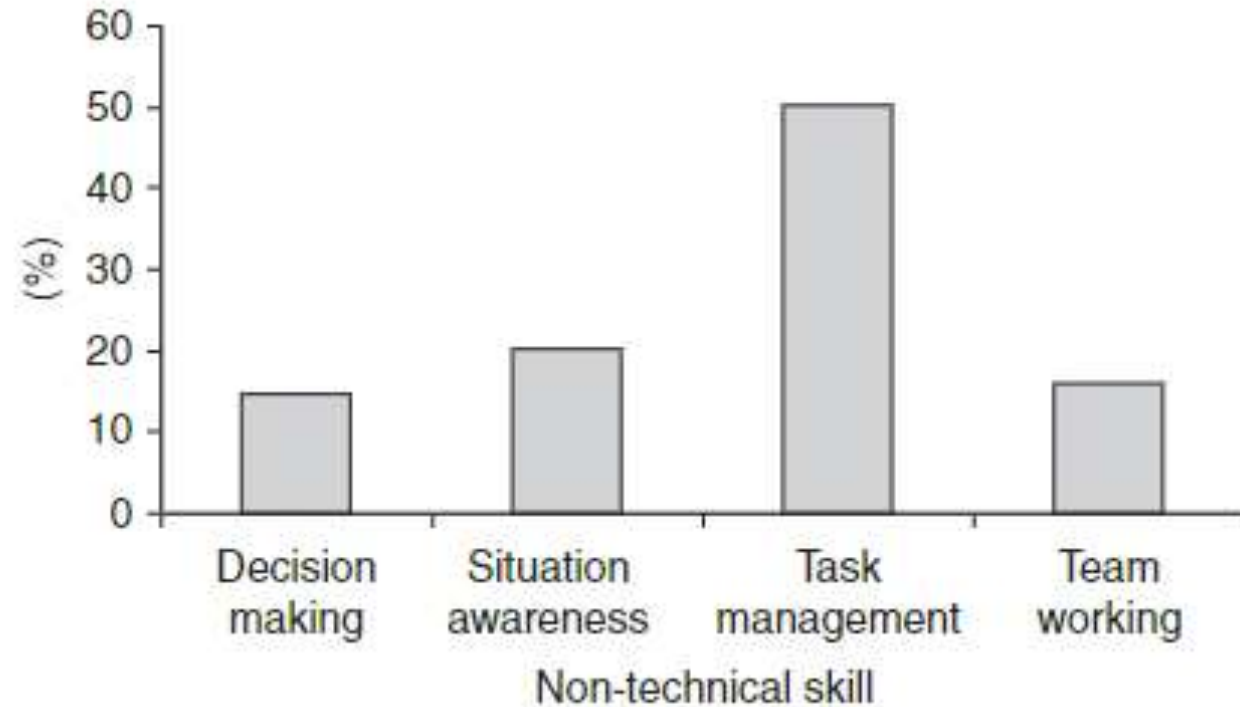


Fig 3 The proportion of contributory factors across all studies (see Table 1) that each of the four non-technical skill categories accounts for.

Reader T, Flin R, Lauche K, Cuthbertson BH. Non-technical skills in the intensive care unit. *Br J Anaesth.* 2006 May;96(5):551-9. doi: 10.1093/bja/ael067. Epub 2006 Mar 27. PMID: 16567346.

Communication

Closed loop communication not known to ward staff and some team members

Information overload from team leader to team members

Information delivery is being performed instead of basic life support

Resuscitation attempt is stopped by team leader without verbal clarification of performed therapy and without involving the team

Hs and Ts principle of reversible causes not being verbally addressed

Communication should follow closed loop principles, where verbal statements are confirmed by the receiver

Communication of tasks should be structured to avoid too much information being addressed to the same person

Information about the patient should be delivered after basic life support is initiated

Abandoning the resuscitation attempt should be done by re-evaluating performed therapy and treatment of potential reversible causes of cardiac arrest

"Specific commands are essential, a response to the command is necessary."

"Doctors should get rid of the habit of throwing around prescriptions."

"Chest compressions are not performed when pre-hospital emergency services are delivering a patient (i.e. in cardiac arrest), due to the need for a verbal handover of the patient to two interns."

"Difficult to decide when to stop treatment . . . should be done based on facts. Go through Hs and Ts thoroughly before withdrawing the treatment."

Category	Barriers for recommended behaviour	Recommended behaviour	Citation examples related to category
Leadership	Gradient of authority in team makes other person team leader	Leader should be clearly identifiable in team	"The team leader often passes on non-verbally the leadership to the more experienced anaesthesiologist."
	Clinical inexperience makes team insecure about team leader's level of competence	Should be clinically experienced	"Do not believe in organisation from the top—the doctors do not have the necessary control of the situation." (Nurse)
	Team leaders with lack of authority are ignored by team members Inexperienced team leaders are expected to lead and learn at the same time	Should communicate efficiently Should delegate tasks to other team members Should gather information from other team members and ward staff	"You do not get experienced if you do not get the opportunity to practise." (Team leadership during resuscitation attempt)

Andersen PO, Jensen MK, Lippert A, Østergaard D. Identifying non-technical skills and barriers for improvement of teamwork in cardiac arrest teams. Resuscitation. 2010 Jun;81(6):695-702. doi: 10.1016/j.resuscitation.2010.01.024. Epub 2010 Mar 20. PMID: 20304547.



Mutual performance monitoring

Team members complete their own tasks and do not take responsibility for tasks of other professional groups

Gradient of authority is respected despite wrong decision making

Strong team leader makes team perform incorrect actions

Team members addressing wrong decisions made by team leaders are met with anger

Chest compressor personnel trained separately

Team members should respect and understand the roles and responsibilities of other team members

All team members should be flexible when they have finished their own tasks

Experienced team members should support inexperienced team leaders

Incorrect performance of chest compressions should be corrected

"To many people, resuscitation means starting the stop watch and opening the resuscitation bag . . . They are locked in their roles, don't want to, and cannot do anything else."

"ALS certified nurses don't get into character, because of their cultural role."

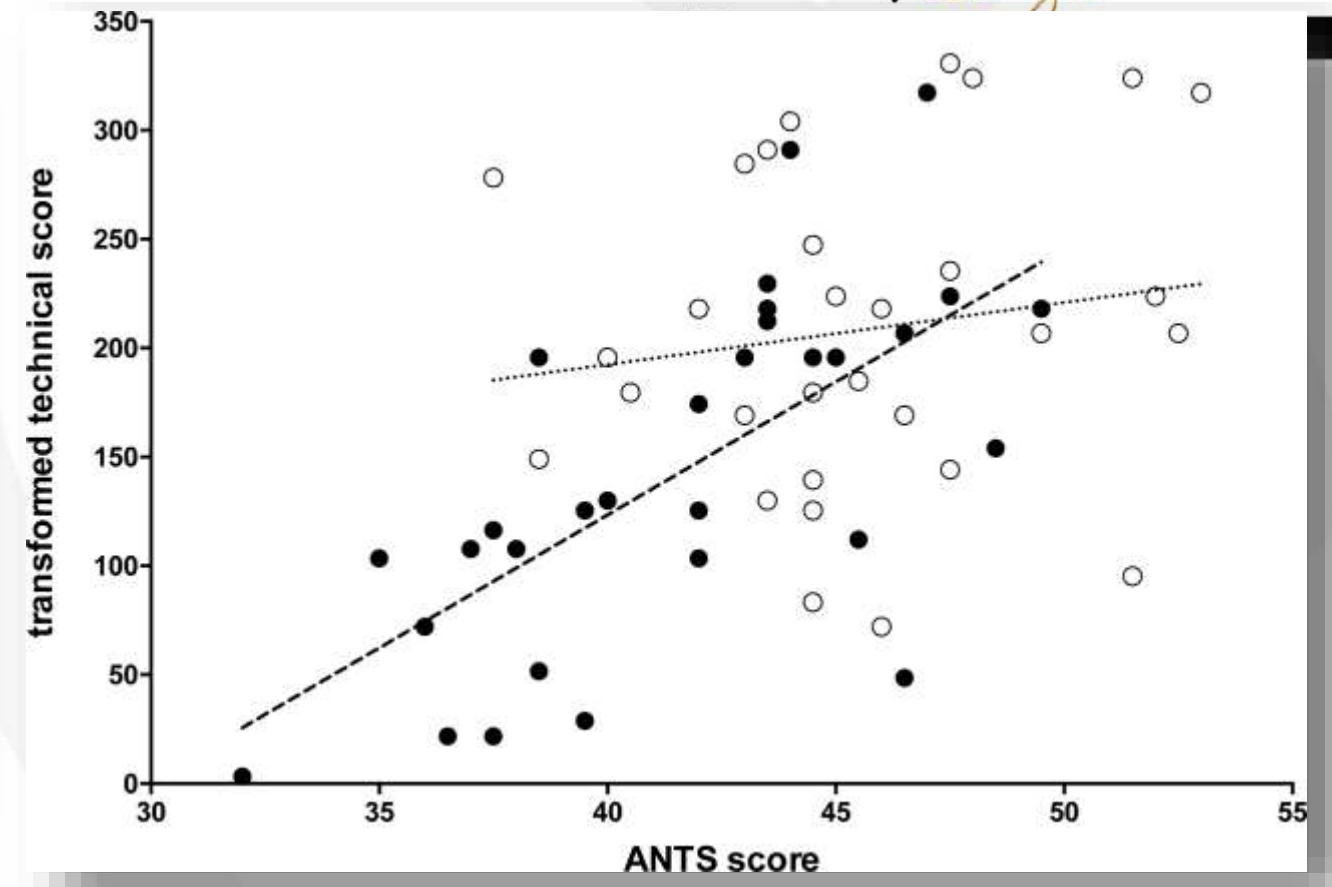
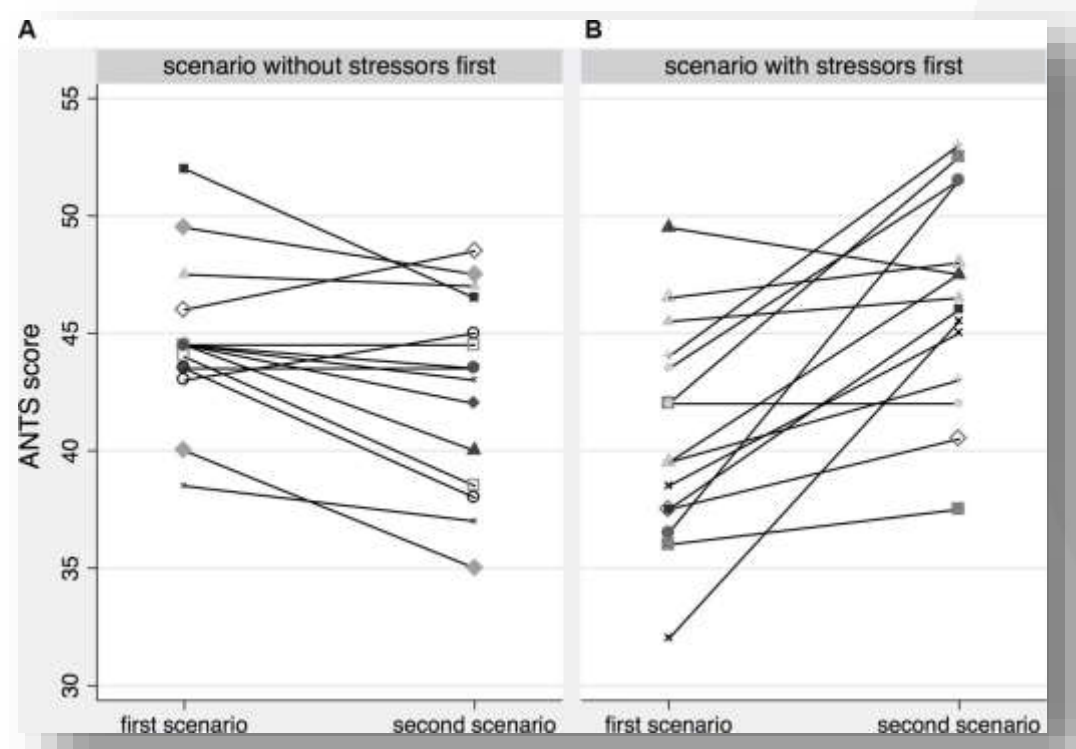
"Often you had the presence of an experienced anaesthetist consultant, but it seemed like he needed to be activated."

"If the team leader is strong, people just do what they are told to do, and when the team leader orders 3 mg Atropine for a sinus tachycardia, oh dear . . ."

"If the doctors deviated from the algorithm, e.g. by prescribing insulin during cardiac arrest, they became angry if we commented on it." (Nurse)

"Orderlies and the whole team should train together."

Andersen PO, Jensen MK, Lippert A, Østergaard D. Identifying non-technical skills and barriers for improvement of teamwork in cardiac arrest teams. Resuscitation. 2010 Jun;81(6):695-702. doi: 10.1016/j.resuscitation.2010.01.024. Epub 2010 Mar 20. PMID: 20304547.



Krage R, Zwaan L, Tjon Soei Len L, *et al.* Relationship between non-technical skills and technical performance during cardiopulmonary resuscitation: does stress have an influence? *Emergency Medicine Journal* 2017;**34**:728-733

Table 2 – Mean item score TEAM.

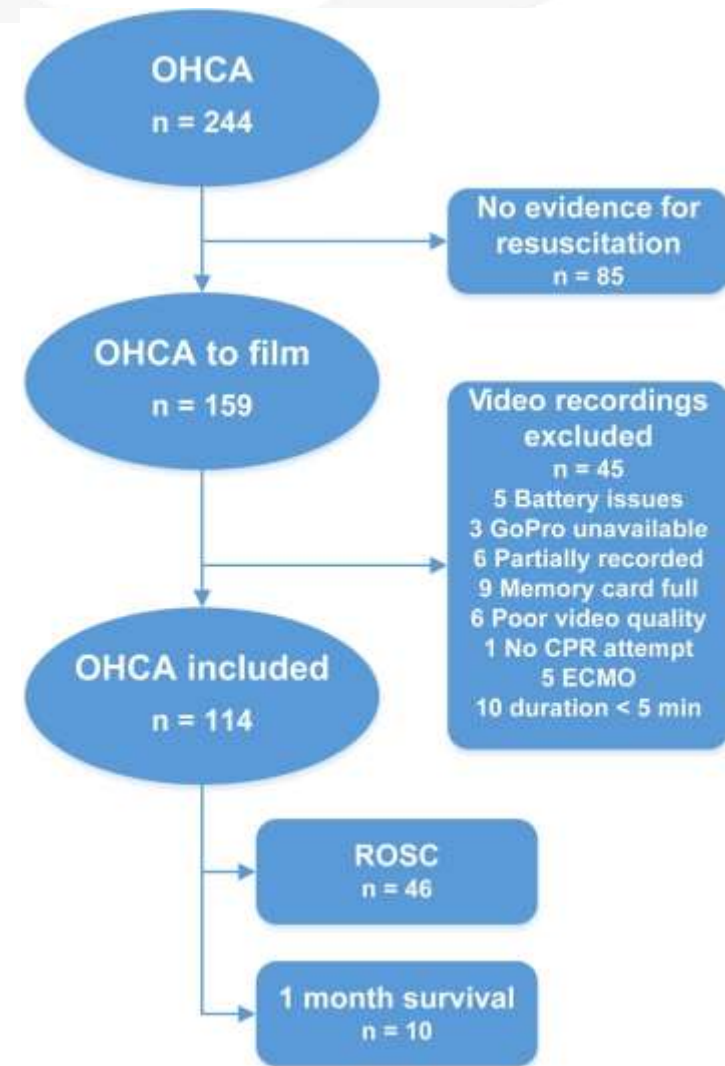
Category	Item	Mean (SD)	Min	Max
Leadership	Q1. The team leader let the team know what was expected of them through direction and command	2.8 (1.0)	0	4
	Q2. The team leader maintained a global perspective	3.1 (0.8)	1	4
Teamwork	Q3. The team communicated effectively	2.4 (0.9)	0	4
	Q4. The team worked together to complete tasks in a timely manner	3.3 (0.7)	2	4
	Q5. The team acted with composure and control	3.4 (0.7)	1	4
	Q6. The team morale was positive	3.3 (0.7)	1	4
	Q7. The team adapted to changing situations	3.3 (0.7)	2	4
	Q8. The team monitored and reassessed the situation	3.3 (0.7)	1	4
	Q9. The team anticipated potential situations	3.1 (0.7)	1	4
Task management	Q10. The team prioritized tasks	3.2 (0.8)	0	4
	Q11. The team followed approved standards and guidelines	3.4 (0.7)	1	4
Global	Q12. Global score (/10)	7.0 (1.4)	2	9
Sum	Total TEAM score (/44)	34.4 (5.5)	11	42
Total	Total score (/54)	41.4 (6.8)	13	51

5-point Likert rating scale: 0: never/hardly never; 1: seldom; 2: about as often as not; 3: very often; 4: always. SD: standard deviation.

Table 3 – Total score in function of ROSC and 1 month survival.

		Mean (SD)
ROSC	Yes	41.8 (6.7)
	No	41.1 (6.9)
1 month survival	Yes	43.9 (7.1)
	No	41.1 (6.8)

SD: standard deviation; CI: confidence interval.



Dewolf P, Vanneste M, Desruelles D, Wauters L. Measuring non-technical skills during prehospital advanced cardiac life support: A pilot study. Resusc Plus. 2021 Oct 8;8:100171. doi: 10.1016/j.resplu.2021.100171. PMID: 34693380; PMCID: PMC8517196.

Table 1 – Description of Trauma-NOTECHS domains and 1-3 scoring scale.

Trauma-NOTECHS			
	1	2	3
Leadership	Team leader clearly recognizable at all times, "birds' eye" view with delegation, transitions of leadership clear, assignment of roles, excellent time management	Team leader defined but does not fulfill all functions or does procedures meant for others or transitions unclear	Team leader not clear
Cooperation and resource management	All team members clearly identified, speak up if help needed, no team members are idle	Role identity of all members not clear, some team members idle some of the time	Role identity of most members not clear, most team members idle most of the time
Communication	Team leader is at the head of the bed, critical communication through the team leader, all orders to team leader, closed loop communication, orders directed to specific people	Communication not always through team leader, orders not always acknowledged	Communication frequently inaudible or incoherent with many simultaneous conversations
Assessment and decision making	Primary and secondary survey done in order and without omissions, findings summarized, goals and plan communicated to the team	Assessment somewhat out of order, some elements of secondary survey incomplete	Elements of the primary survey incomplete, multiple team members unclear about the next step
Situation awareness	Unforeseen findings, distractions, or change in patient condition did not disrupt orderly evaluation. Team is calm, team plans ahead, awareness of team members emotional condition	Unforeseen findings caused minor delay but did not preclude task completion	Unforeseen events disrupt patient assessment and treatment. Team members stressed, lack of anticipation of next steps

Table 3 – Univariate analysis of the association between T-NOTECHS domain scores and the primary outcome of ROSC.

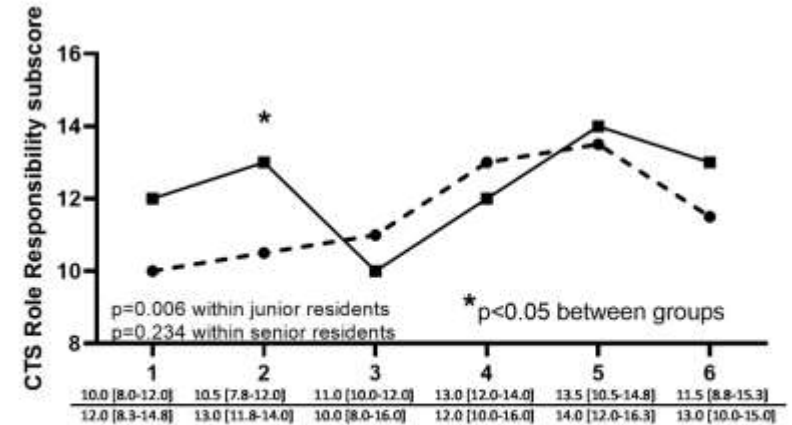
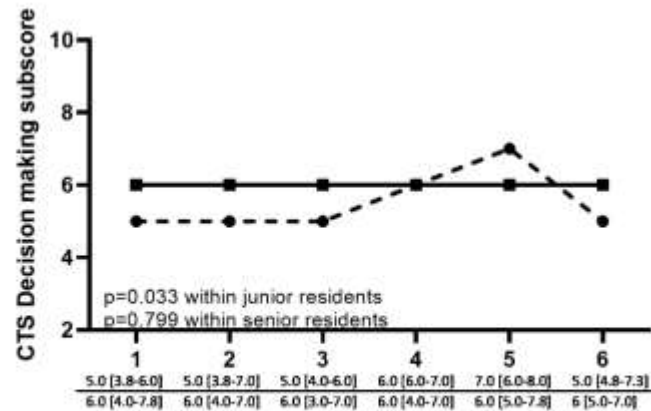
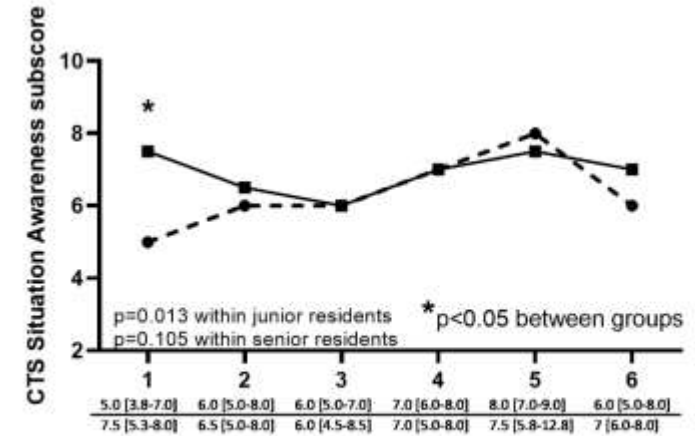
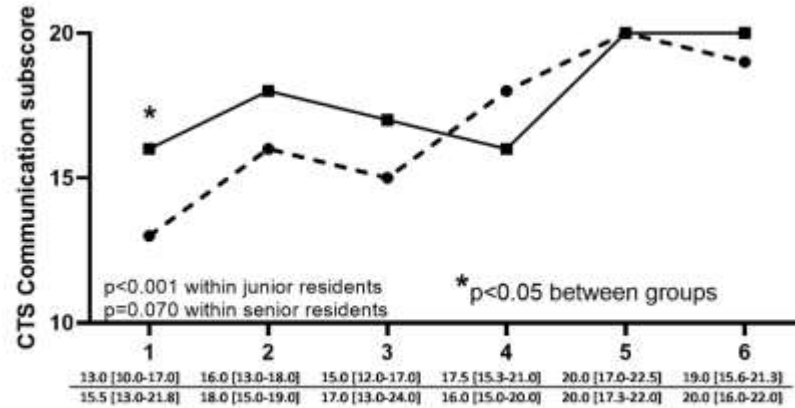
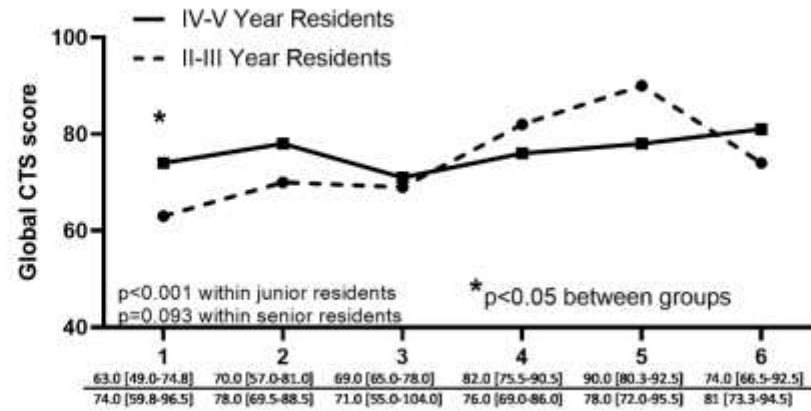
Demographics	OR, 95% CI	P-value
Leadership	1.62 (0.53-4.86)	0.39
Cooperation and resource management	2.48 (0.82-7.49)	0.11
Communication	2.05 (0.65-6.41)	0.22
Assessment and decision making	5.33 (1.35-21.06)	0.02
Situation awareness	1.42 (0.47-4.30)	0.54
Total T-NOTECHS score	1.20 (0.97-1.57)	0.09

OR = odds ratio; CI = confidence interval.

Dumas RP, Vella MA, Chreiman KC, Smith BP, Subramanian M, Maher Z, Seamon MJ, Holena DN. Team Assessment and Decision Making Is Associated With Outcomes: A Trauma Video Review Analysis. *J Surg Res.* 2020 Feb;246:544-549. doi: 10.1016/j.jss.2019.09.033. Epub 2019 Oct 18. PMID: 31635832; PMCID: PMC8406277.

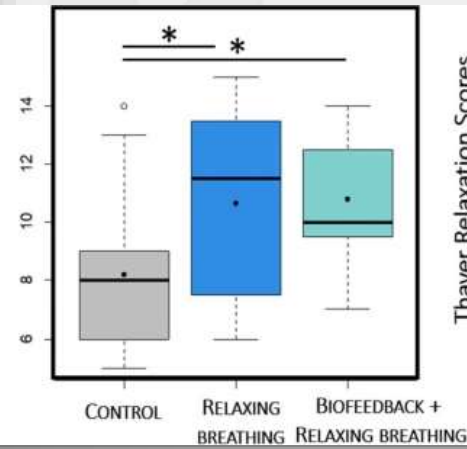
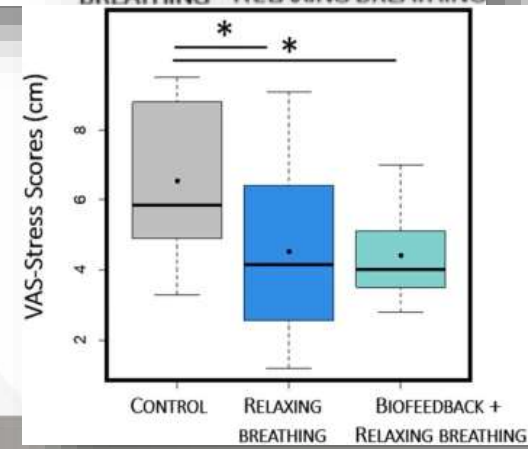
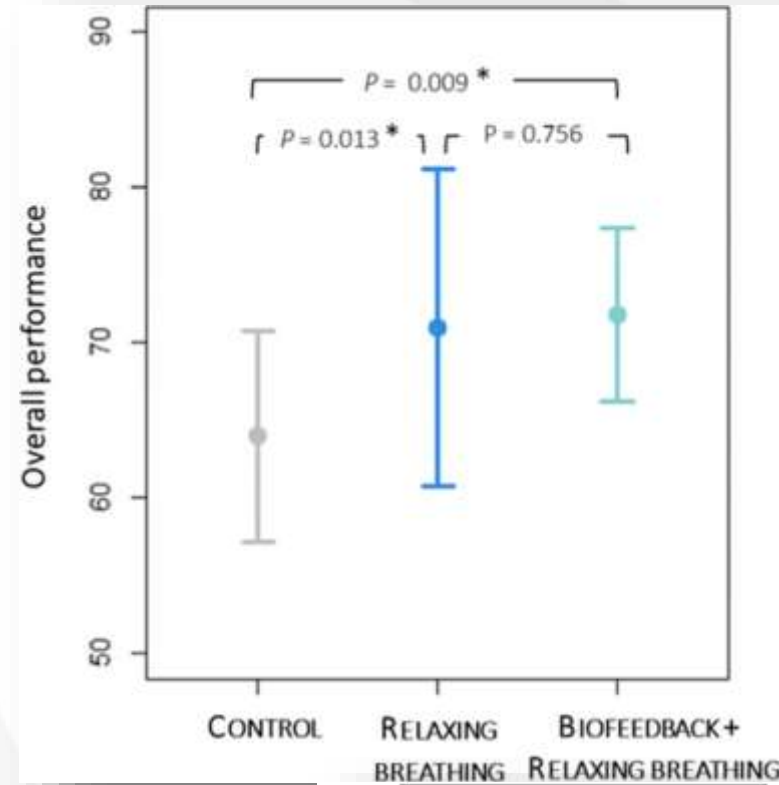
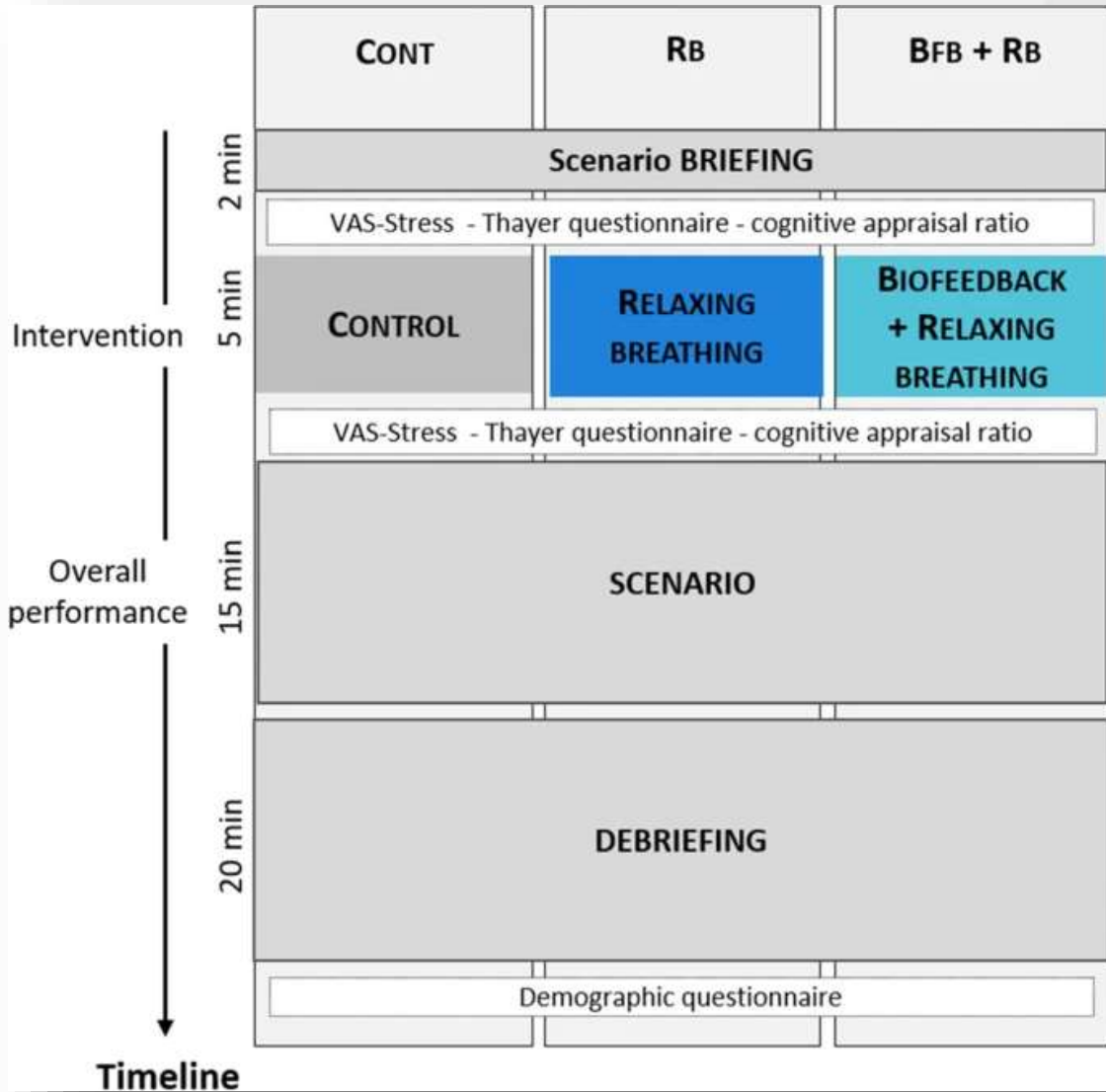
How to improve NTS

High fidelity simulation and NTS



Innocenti F, Tassinari I, Ralli ML, Bona A, Stefanone VT, Audisio R, Meo F, Grifoni C, Pini R. Improving technical and non-technical skills of emergency medicine residents through a program based on high-fidelity simulation. Intern Emerg Med. 2022 Aug;17(5):1471-1480. doi: 10.1007/s11739-022-02940-y. Epub 2022 Feb 18. PMID: 35181840.





Take home messages

- NTS hanno un ruolo rilevante nella performance del team ed in termini di sicurezza
- Le NTS costituiscono uno dei meccanismi di controllo delle risposte negative allo stress da parte del team
- Esiste una influenza reciproca tra stress, NTS e performance
- All'aumentare dei livelli di stress la performance dipende in maniera più rilevante dalle NTS
- E' possibile migliorare le NTS ed i meccanismi di risposta allo stress

Italian Resuscitation Council

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