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Simulation and education

Team Emergency Assessment Measure (TEAM) for the assessment of non-technical skills during resuscitation: Validation of the French version☆

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ABSTRACT

Aim: Evaluation of team performances during medical simulation must rely on validated and reproducible tools. Our aim was to build and validate a French version of the Team Emergency Assessment Measure (TEAM) score, which was developed for the assessment of team performance and non-technical skills during resuscitation.
Methods: A forward and backward translation of the initial TEAM score was made, with the agreement and the final validation by the original author. Ten medical teams were recruited and performed a standardized cardiac arrest simulation scenario. Teams were videotaped and nine raters evaluate non-technical skills for each team thanks to the French TEAM Score. Psychometric properties of the score were then evaluated.
Results: French TEAM score showed an excellent reliability with a Cronbach coefficient of 0.95. Mean correlation coefficient between each item and the global score range was 0.78. The inter-rater reliability measured by intraclass correlation coefficient of the global score was 0.93. Finally, expert teams had higher French TEAM score than intermediate and novice teams.
Conclusion: The French TEAM score shows good psychometric properties to evaluate team performance during cardiac arrest simulation. Its utilization could help in the assessment of non-technical skills during simulation.

Introduction

Non-technical skills (NTS) are cognitive and social skills that complete clinicians' technical abilities. NTS covers situation monitoring, decision making, leadership, communication and cooperation between team's members.[1] There is a growing interest in the development of NTS and team work in medical practice as they are thought to increase patients' safety and care efficiency.[2] During the last 10 years, simulation has taken an increasing part in NTS learning showing better efficiency than traditional medical education.[3,4] However, limited evidence exists on the impact of clinician's NTS development on patients' outcome.[5] The main barrier for evaluating NTS impact on patients' safety is the absence of specific assessment methods during simulation.[2,5] It is indeed difficult to assess participants' progress in terms of NTS acquisition.

Cardiopulmonary resuscitation is the most frequently simulated medical situation that is evaluated for NTS and team performance.

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This may be explained by various reasons including the release of international guidelines on a regular basis; the possibility of simulating cardiac arrest on manikins and standardizing scenarios; and the proven association between NTS and team performance during resuscitation.[6,7] In this context, various tools dedicated to the assessment of different NTS components during cardio-pulmonary resuscitation have been published over the two last decades.[8–11] The Teamwork Emergency Assessment Measure (TEAM) is an observational scale designed for measuring team processes and performance, which has been developed and validated in accordance with the psychometric theory.[11–13] It comprises 11 items rated on a 4-point Likert response scale and covering 3 dimensions – namely leadership, team work, and task management – and one overall team performance rating item. Originally developed in English, the TEAM scale has never been translated and a French version is currently lacking.

Our aim was to perform the cross-cultural adaptation of the TEAM score into French language and to evaluate the reliability and validity of the resulting French version (hereby called f-TEAM).

Methods

Study design

This study complied with guidelines for reporting cross-cultural adaptation and measurement properties of questionnaires.[14–16] First step of the study was the translation of the TEAM score. 10 teams were video recorded during simulation training on cardiac arrest management. Finally, experts were asked to rate and fulfill the French TEAM score based on the videos. This study was conducted at the Alpes MediSim Center of the University Hospital of Grenoble, France. According to French law, this research was not considered to be medical research and no approval from an ethic committee was required. However, all participants were volunteers and gave their written informed consent for videotaping and data gathering.

Translation and cross-cultural adaptation

The first part of the study required the translation of the TEAM Score from English to French. A forward and backward translation was conducted. First, two professional medical translators, one English native and one French native, translated the score from English to French. They compared their translations and proposed a unique French version of the score. Two other professional translators, one English native and one French native, blinded from the original version of the score, translated back the score to English. Once again, translators matched their versions and suggest a unique English version. This latest version was submitted to the original author of the TEAM (SC) score who verified the consistency of this version with the original one. The original author made final recommendations that were translated back to French to complete the final French version called f-TEAM (Fig. 1).

Participants

Ten teams of four care providers were recruited to complete cardiac resuscitation simulation. Care providers with different levels of skills and knowledge were purposely selected and we formed 10 teams based on participants' level of medical education: three "novice" teams including medical students in their 5th year; four "intermediate" teams including residents; three "expert" teams including board certified emergency physicians. Each team consisted in four participants. The team leader was designated by the team members just before the simulation. In each team, participants had similar level of medical education and experience and the designation of the team leader by mutual consent was supposed to be the closest choice to clinical practice. All participants recently attended the same Advances Life Support course based on 2010 ERC Guidelines. Thus, they were expected to follow the same protocol. The adequacy of care to 2010 guidelines was estimated in the 11th question of the TEAM score.

Before the simulation session, all participants got a 30 min demonstration of simulation equipment. All teams completed the same simulation scenario: a male patient in his forties suffering from chest pain is admitted in the emergency department; ECG shows an inferior ST elevation; 5 min after first medical contact, patient experiences ventricular fibrillation. Return of spontaneous circulation was achieved after the third shock if standard cardiac arrest treatment was performed. Total length of the scenario was 15 min, including 8–10 min of cardiac arrest. Simulation was performed on a SimMan3G manikin (Laerdal Medical, Norway).

Data collection

The whole simulation was video recorded to enable *a posteriori* evaluation by independent raters. Three cameras were distributed to film the entire simulation room. Each participant was equipped with a personal high fidelity microphone. Audio and video recordings were mixed with dedicated hardware and software (ATEM 1M/E Production Studio 4K and ATEM Software Control Panel, Blackmagic Design, CA, USA). The video screen was divided into four views: three views of the scene and one view of the manikin monitoring (ECG, noninvasive arterial pressure, pulse oximetry, and capnography). In order to standardize the process of evaluation, each video was cut to reach duration of 10 min.

Nine raters with at least two years of experience in medical simulation were recruited to fill the f-TEAM score. Raters were previously instructed in the aim of the study but no specific training on the score was provided because the original TEAM score has been described as intuitive and easy to use.[11,13] Each rater had at his disposal the videos of the simulation. They watched the video on personal computers and filled in the f-TEAM score at the end of each scenario. Raters had access to an online version of the f-TEAM score (LimeSurvey, https://www.limesurvey.org). Raters were asked to watch videos in a specific order which was randomly established before the beginning of the evaluation.

Statistical analysis

Baseline participant characteristics were reported as numbers and percentages for qualitative variables and median and interquartile range (*i.e.*, 25th–75th percentiles) for continuous variables. Using established criteria.[17] The psychometric properties of the f-TEAM score, including acceptability, construct validity, internal consistency, and inter-rater reliability were evaluated.

Acceptability was assessed through the numbers and percentages of missing values for each item and the number of questionnaires with a missing value for one or more items. The numbers and percentages of response on anchor points for items, subscale score, and overall scores were examined to detect floor or ceiling effects. Floor and ceiling effects lower than 15% for subscale and overall scores were considered acceptable.[17] Internal consistency was evaluated through average inter-item correlation, item-scale correlation, and Cronbach's alpha coefficient. Item scale correlation >0.40 and Cronbach's alpha >0.70 were considered satisfactory.[17] Inter-rater reliability was assessed with intraclass correlation coefficient (two-way mixed model focusing on absolute agreement). Intraclass correlation coefficient >0.70 was regarded as denoting satisfactory agreement.[17,18] To investigate construct validity, the nonparametric Kruskal–Wallis test for comparing f-TEAM scores according to the level of the teams (novice,