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ORIGINAL RESEARCH

Identifying Situational Awareness Behaviors in Trauma Teams; a Nominal Group Technique Study

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Abstract: **Introduction:** Situational awareness (SA), as a nontechnical human factor, is critical to the success of a trauma team. This study aimed to identify representatives of behaviors supporting (desirable) and diminishing (undesirable) SA for trauma teams while performing the initial assessment of multi-trauma patients. **Methods:** This Nominal Group Technique Study was conducted on twenty attending physicians from various specialties affiliated with Tehran University of Medical Sciences, who were invited to a nominal group technique meeting in 2020. Participants were asked to write down their proposed behaviors in silence. Subsequently, each participant shared their list with the group in a round-robin format, and clarifications were made through discussion. After categorizing the ideas, we asked participants to rate each behavior's importance on a five-point Likert scale. The consensus was defined as ≥70% agreement on a rating of 4 and 5. **Results:** The final SA behaviors for the trauma team consisted of 29 (22 desirable and 7 undesirable) behaviors arranged in seven dimensions: resource allocation, anticipate and plan, avoid fixation errors, call for help if needed, prioritize attention, reassess patient, and shared mental model. The most important desirable and undesirable behaviors were identified in resource allocation (n=8) and avoid fixation errors (n=7) dimensions, respectively. Resource allocation behaviors consist of 'checking necessary equipment', 'allocating an alternative person(s) to do the required task if needed', 'assigning tasks to the right person(s)', and 'Addressing each team member with a requested task'. Avoid fixation errors behaviors were 'insisting on performing the procedure', 'making decisions without considering all available information', and 'emphasizing others' expertise in the diagnostic process'. **Conclusion:** The proposed team SA behaviors may be used in assessing the trauma team performance and training program to promote trauma team SA.

Keywords: Awareness; Multiple trauma; Patient care team; Behavior

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1. Introduction

Trauma continues to be an important cause of morbidity and mortality worldwide (1). Trauma was introduced as the leading cause of death (COD) for individuals aged 46 years and less between 2000 and 2010 in the US (2). On the other hand, more than 90% of injury-related deaths occur in low- and middle-income countries (3). In Iran, trauma is ranked second among CODs (4). Although these findings are discouraging, effective teamwork and making accurate decisions in the trauma teams are significant factors in reducing the rate of preventable trauma deaths (5). Non-technical human factors including leadership, communication, teamwork, and situational awareness (SA) are critical to the management of a complex trauma patient and the success of trauma teams

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(6, 7). SA, in particular, seems to be necessary for decision-making, task management, and effective performance within the dynamic and complex situations of trauma teams (8).
Endsely (1995) described SA as three hierarchical levels of the "perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and a projection of their status in the near future" at the level of individuals and teams (9). Individual SA refers to each team member's awareness and understanding of the dynamic information related to the current environment and task, while team SA denotes the shared understanding of a situation among team members at one point in time that facilitates their interactions, teamwork processes, and task performance (10-15). Team SA has been demonstrated to be a strong predictor of team performance in healthcare, including a multidisciplinary operating room, emergency response teams, and trauma teams (16-21).
Studies conducted in Iran showed the importance of teamwork, barriers and facilitators, and teamwork training methods in the health care delivery system (22-28). To improve teamwork and team decision-making, challenges have been reported in communication and coordination between teammates, which emphasize the importance of cognitive and social skills in improving team performance (29-31). Several studies suggested the use of different educational strategies to enhance the non-technical skills among healthcare staff members to improve teamwork (32-36). In an integrated review in 2020, Hosseini et al. identified situational awareness as the most common element of teamwork in resuscitation (7). Gurbanpour et al., in 2020, examined the factors affecting the situational awareness of health staff in the operating room and considered training through practical experience as the main factor in increasing the level of situational awareness (37). In Iran, SA studies have been done on transportation, pilots, firefighter, Shooting, etc (38-42). So far, no studies have been performed on training and assessing situational awareness in complex therapeutic environments, including trauma, in Iran.
Walshe et al. (2021) in their review highlighted that the literature about team SA in healthcare has been mainly focused on understanding how multidisciplinary healthcare teams acquire and maintain SA or how team SA influences clinical performance and patient safety (43). There are few reports about quantifiable behaviors representing team SA in healthcare multidisciplinary teams (7). Meanwhile, measurable indicators of team SA are required for precision assessment to capture the complexity of team SA. Another challenge associated with SA is that it is a highly contextual concept, which makes it difficult to determine a general set of behavioral indicators to operationalize it (44, 45). Team SA can be characterized as teamwork behaviors that are the product of the team's cognitive process of evaluating the current situation. Such behaviors are observable and can be assessed, practiced, and trained (10-14).
O'Neill et al. (2018) offered a multidimensional framework of observable behaviors of team SA for an emergency (resuscitation task) and provided evidence regarding its reliability and validity then compatibilized the framework with Endsley's three-dimensional model in the context of team effectiveness (9). The framework consisted of seven dimensions: resource allocation, anticipate and plan, avoid fixation errors, call for help if needed, prioritize attention, reassess patient, and shared mental model (46).
Given the importance of SA for effective trauma teams, this study aimed to identify and reach a consensus on desirable and undesirable behaviors that represent the SA for trauma teams while performing the initial assessment of multiple trauma patients. We focused on the initial assessment task since it is the first and the most critical step toward decreasing both morbidity and mortality in trauma patients (47). This study aimed to identify representatives of behaviors supporting (desirable) and diminishing (undesirable) SA for trauma teams while performing the initial assessment of multi-trauma patients.

2. Methods

2.1. Study design and settings

This Nominal Group Technique Study was conducted on twenty attending physicians from various specialties affiliated with the Tehran University of Medical Sciences (TUMS), who were invited to a nominal group technique meeting in 2020. Participants were asked to write down their proposed behaviors in silence. Subsequently, each participant shared their list with the group in a round-robin format, and clarifications were made through discussion. The Institutional Review Board of Tehran University of medical sciences approved the study (IR.TUMS.IKHC.REC.1400.302).

2.2. Participants

Twenty attending physicians with a specialty in emergency medicine (n=5), general surgery (n=5), anesthesia (n=5), orthopedics (n=3), and neurosurgery (n=2) were invited to participate in this study if they had at least five years of experience working in trauma teams (48, 49).

2.3. Data collection

A nominal group technique (NGT) proposed by Humphrey Morto et al. (2017) was used with modifications of step four (voting) to identify and reach a consensus on the most important behaviors representing the trauma team SA during the initial assessment of a multi-trauma patient (48). Participants who agreed were provided with explanations about the concept of SA and its examples at the team level as well as in-

formed consent form via email. The NGT meeting was conducted at one of the hospitals affiliated with TUMS in February 2020 and moderated by a medical education specialist (RG) and a surgery attending physician (AJ). In the first step (i.e. a silent listing of items), the aim and procedures of the meeting, and a brief overview of the team SA concept was presented by one of the authors (AR). Then two questions were asked about the desirable and undesirable behaviors representing team SA during the initial assessment of multiple trauma patients and participants were asked to write down their ideas, independently and silently, in response to questions without any permission to discuss their responses with others. Desirable and undesirable behaviors were defined as those that support (desirable) or diminish (undesirable) trauma team SA. In the next step, these responses were shared with all participants in a round-robin format without discussion or explanation. Participants were encouraged to use other participants' responses to write down new ideas that may not have been considered in the previous round. Round-robin was continued until no new information was generated. All responses were typed word by word on the Word Office@ 2016 (Microsoft Corporation, Redmond, Washington) by AR and displayed to the participants simultaneously using a video projector. During these steps, the number of responses was not limited and participants could list as many behaviors as they wanted.

After the round-robin portion, moderators briefly discussed each proposed item for clarification in terms of ideas representing team SA for the initial assessment task and consolidating similar responses, without any judgment or criticism. Since participants' responses were mainly narrations of their experiences (instead of behaviors) and appreciating the participants' limited time, the remainder of the meeting was performed off-site. We consequently, analyzed the narrations, qualitatively, to extract and categorize team SA behaviors. During the voting step, the classified behaviors were provided online to the participants of the NGT meeting and they were asked to rate the importance of each of the behaviors based on a five-point Likert scale from five (very important) to one (not important).

2.4. Data analysis

We utilized qualitative and quantitative methods to analyze data collected during the NGT meeting. For qualitative analysis, the first author (AR) read and re-read the narrations and extracted the related behaviors, and then, another author (RG) reviewed the initial coding, independently. The two authors discussed extracted behaviors and agreed on them. Behaviors were merged based on similarities and then grouped into dimensions using a framework previously described (46). Table 1 describes each SA dimension and provides example quote(s) corresponding to extracted behaviors. Behaviors and dimensions were finalized by receiving other authors' (AJ and MJ) comments.

During the quantitative analysis, descriptive statistics, including frequencies, means, and standard deviations were calculated using Microsoft Excel@ 2016 (Microsoft Corporation, Redmond, Washington) for raw data derived from the voting step. We calculated the frequency of votes for reporting the level of agreement and calculated the mean based on the number of participants as well as a measure of dispersion for reporting the importance rating of each behavior. We defined consensus as ≥70% agreement for a rating of 4 (important) and 5 (very important) (48). We used an existing validated frame (O'Neill's framework) to classify the behaviors and to examine if the domains apply to another task in an emergency.

3. Results

3.1. Participants

Table 2 presents the descriptive data of the study participants. Seventeen attending physicians, who were specialists in emergency medicine, general surgery, orthopedics, and anesthesia, voluntarily participated in the three-hour NGT meeting. Two invited neurosurgeons did not attend. Thirteen completed the questionnaire in the voting step. Fourteen (82.35%) and 10 (76.93%) participants were male in the NGT meeting and voting step, respectively. Emergency medicine specialists had the highest experience working in trauma teams among participants.

3.2. Team SA behaviors for initial assessment of multiple trauma patients

Throughout the qualitative analysis, a total of 38 behaviors (27 desirable and 11 undesirable) were categorized into the seven dimensions described above. After quantitative analysis, 29 behaviors (22 desirable behaviors and seven undesirable behaviors) in the same seven dimensions were agreed upon by ≥70% of participants. Most of the desirable and undesirable behaviors were identified in resource allocation (n=8) and avoid fixation errors (n=7) dimensions, respectively. No undesirable behavior was reported for the four dimensions of resource allocation, call for help if needed, patient reassess, and a shared mental model (Table 3). Table 4 demonstrates the levels of agreement per behavior. Further details on identified desirable and undesirable behaviors in each of the seven behavioral dimensions of team SA are described below.

3.3. Resource allocation

Four desirable behaviors scored 100% agreement in this dimension: 'checking necessary equipment for monitoring and diagnosis', 'allocating an alternative person(s) to do the

required task if needed', 'assigning tasks to the right person(s) with relevant expertise', and 'Addressing each team member with a requested task'.

3.4. Anticipate and plan

The most important desirable behaviors were 'Preparing facilities and required drugs before performing the procedure' and 'Announcing clinical findings and corresponding therapeutic interventions', which scored 100% and 92.30% agreement, respectively. The most important undesirable behavior was 'Making equipment and medications available with a delay', with 92.30% consensus.

3.5. Avoid fixation errors

92.30% of the specialists agreed with two desirable behaviors 'using new data to consider other clinical findings' and 'suggesting possible alternative diagnosis or differential diagnosis'. Undesirable behaviors were 'insisting on performing the procedure of their choice when unnecessary', 'making decisions without considering all available information', and 'emphasizing others' expertise in diagnostic or therapeutic actions' with a 92.30% consensus.

3.6. Call for help if needed

In this dimension, the most important desirable behaviors including 'consulting the senior resident' and 'consulting other specialties as needed' were agreed upon by 92.30% and 76.92% of the specialists, respectively.

3.7. Prioritize attention

'preventing and minimizing distractions by the team leader' acquired 92.30% agreement as a desirable behavior. The 'direct engagement by the team leader to accomplish teammates' tasks' was identified as undesirable behavior with 92.3% consensus.

3.8. Reassess the patient

The most important desirable behavior was 'reassessing and reporting changes in patient condition' with 100% consensus.

3.9. Shared mental model

The most important desirable behaviors that were identified with 84.62% consensus were 'reviewing the patient's condition from the beginning of the trauma code', 'reviewing all suggested and conducted measures', and 'sharing all information and the anticipated course with team members'.

4. Discussion

The consensus on important desirable and undesirable behaviors representing team SA during the initial assessment of the multi-trauma patients from the perspective of attending physicians was identified. The predetermined team SA dimensions (i.e. resource allocation, anticipate and plan, avoid fixation errors, call for help if needed, prioritize attention, reassess patient, and shared mental model) proposed for resuscitation were employed so that apply to another task in an emergency. Our findings support the notion of operationalization of a common core of SA dimensions for specific tasks (50).

These findings indicated that the highest number of desirable and undesirable behaviors for supporting and diminishing trauma team SA were related to resource allocation and fixation errors dimensions, respectively. The main reason lies in the definition of the team. According to Baker et al. (2006), the team consists of two or more individuals, who have specific roles, perform interdependent tasks, are adaptable, and share a common goal (51).

Therefore, the multidisciplinary trauma teams should be switching simultaneously between ABCD (airway, breathing, circulation, and disability) sequences by focusing effectively on priorities in both evaluation and treatment of the critical condition under the intense time pressure (47). Based on our knowledge, in teaching team SA to multidisciplinary teams, while performing a systematic task, two dimensions including resource allocation and avoid fixation errors should be considered. Therefore, identifying team SA behaviors allows us to capture educational content that could then be designed to improve teamwork behaviors and reduce SA problems. Fixation error can be the source of most SA errors in multidisciplinary teams, but no studies have previously presented this type of cognition error. Accordingly, Nikouline et al. (2021), in a systematic review of the errors in adult trauma resuscitation, reported that the well-identified behaviors in resource allocation help correct errors related to patient monitoring, team communication/dynamics, and performing procedures (52).

Desirable behaviors considered by specialists for the "resource allocation" dimension were mainly focused on managing the task, team composition, and crisis resources by the team leader. Another study has shown the task management role in reducing the workload of leaders and team members throughout the induction of general anesthetics (53). Team composition management has been demonstrated effective in forming the transactive memory system and subsequently, in improving the performance of teams (54); it has also been included as one of the organizational factors that influence trauma teamwork and facilitate the implementation of the non-technical skills (situational awareness, leadership, and teamwork) during trauma emergencies (55). Finally, in Crisis Resource Management (CRM), determining a replacement person(s) due to the limited ability of other members to perform specific skills, and equipment availability (location and

storage) has been indicated as an influential human factor (56, 57).

For the "anticipate and plan" dimension, most of the desirable behaviors that were identified and agreed upon by experts were those with the use of verbal actions such as announcing the possible facilities and drugs, patient clinical findings, and treatment measures between team members, which are in line with Parush et al.'s (2011) findings. Their study identified situation-related speech acts as verbal communication behaviors (request, announcement, question, reply, etc.) that enabled sharing of information among healthcare workers in the operating room (58).

The identified behavior of 'Preparing facilities and required drugs' before performing a procedure or with a delay is similar to the reported behavior in O'Neill's framework (46). This behavior with a delay may indicate a lack of implicit coordination in the presentation of the action based on shared knowledge and action anticipation and team members' needs (58-60).

Desirable and undesirable behaviors for the "avoid fixation errors" dimension highlight the importance of a person's awareness to gather information by noticing other symptoms, even if they are quite prominent, and also by understanding each other's actions in the team and respecting the roles of other team members in team performance (61, 62). One critical feature in the behavior of the fixated person or team is a form of persistence over time that has been considered by specialists as undesirable behavior. They are consistent with De Keyser and Woods (1990) patterns of behavior that have been observed in cases of practitioner fixation such as "this and nothing else", "everything but that" and "everything is Ok" (63). The above behaviors are essential for excellent team performance in stressful situations and support team adaptation to sudden changes in patient status (64-66). A fixation occurs when a situation assessment or course of action has failed to revise more evidence about problems in attentional dynamics. In this dimension, attention is a critical factor that moderates situational awareness; and training in mental skills is needed to enhance attention management and reduce the impact of stress (63, 67).

For the "call for help if needed" dimension, desirable behaviors were concentrated on seeking help and consultation from an experienced colleague or experts outside the team. These behaviors are one of the main factors that influence clinical practice and problem-solving strategies (68). Help-seeking and consulting have been reported as backup behavior that team leaders employ for team adaptation and coordination, particularly in high-risk situations (69, 70).

In "prioritizing the attention" dimension, two undesirable behaviors were found in relation to the leader being directly engaged in tasks that can be accomplished by other team members. The only agreed upon desirable behavior was in line with managing distractions, i.e. unnecessary phone calls, the presence of disabled people, etc., while maintaining calm and attentiveness as a team leader. This behavior is consistent with the results of Fernandez et al. (2020) on team leadership behavior during actual trauma resuscitations (71). Although resource allocation and priority attention were among the studied dimensions in this study, 'determining the team leader' has not been identified as an important teamwork behavior, possibly, because of the senior level and high experience of the specialists in the nominal group.

In the "patient reassess" dimension, desirable behaviors such as reporting or asking about patients' status (airway, respiration, blood circulation, etc.) are similar to the reported behavior in O'Neill's framework (46). Consistent with our findings, Parush et al. (2011) indicated that the implicit and explicit coordination of information exchange in the form of providing situation-related information without request and obtaining the required information about the situation is in the team adaptability direction (58). Fixation error has been avoided by actively reassessing the situation (63).

In the shared mental model, the desirable behaviors with the highest importance are consistent with team SA mechanisms that facilitate the process of achieving shared SA among team members to similarly interpret information and support accurate anticipating of each other's actions (72). According to Mohammed et al.'s study results (2001), team members activate the implicit communication that characterizes highly effective teams by sharing the correct mental models (73).

The emergency process team model of Fernandez et al. (2008) indicated teamwork dynamics in three phases: planning, action, and reflecting (74). In our study, behaviors indicating the teamwork reflecting phase, including the debriefing process after the task and team performance evaluation, were not identified.

Behaviors representing the team SA are cognitive and behavioral processes that provide all members with sufficient information and share information about other members to achieve the team SA by knowing about each other, the team plans the work more reasonably and assigns tasks to the people who perform best. This explicitly improves coordination because team members can predict each other's behaviors (implicit coordination) rather than simply reacting (53, 54).

Teaching these behaviors should be indirect and trigger self-reflection. However, lecture-based training is recommended to develop an understanding of team SA's importance in clinical teaching and establish a knowledge foundation. Team SA learning needs sufficient opportunities to experience interactions between individuals, equipment, and the environment (75).

Literature shows that movie-based teaching courses and practices using simulation promote visualizing concepts and engage learners in real scenarios to improve their abstract

conceptualizations and behavior in the future, respectively (76-78). In addition, reflecting upon the experiences and receiving feedback after practice can enhance knowledge integration (79). Assessing and providing feedback based on observation of team SA behaviors has been addressed by the behavioral markers (46). Our findings not only highlight the identified behaviors of team situational awareness in the context of trauma for practitioners, but also consider behaviors that could have delayed the diagnosis. Therefore, understanding these human behaviors is essential for error reduction and improving patient safety (80).

5. Limitation

In the present study, participants imagined a hypothetical situation in identifying team SA behaviors that cause the loss of several behaviors in the real environment while performing the task. Thus future research should consider observing teamwork in a simulated environment based on event-based scenarios that can complement this set of behaviors during the task.

The absence of other team members like nurses, respiratory therapists, and technicians, as well as only senior and experienced clinicians participating in the NGT can be a factor in not identifying different behaviors from different views. This matter should be considered in future research to design team SA training based on different levels such as senior and junior clinicians. Gender inequity and the lack of complete response rates are the other limitations that should be addressed in future research.

6. Conclusion

This study identified team SA behaviors during the initial assessment of multi-trauma patients by gaining consensus among multidisciplinary specialists. Identifying and analyzing resource allocation and the avoid fixation errors can be considered the basis for training and assessing team SA in the trauma context.

7. Declarations

7.1. Acknowledgments

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7.2. Financial support

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7.3. Conflict of Interest Disclosure

The authors have no potential conflicts to disclose.

7.4. Authors' contribution

AJ, RG, and AR, formulated the research idea. AJ, RG, and AR facilitated the nominal group meeting. AJ, RG, MJ, KB, and AR performed the analysis and interpretation of the data. RG and AR wrote the manuscript and critically edited the draft of the paper. All authors approved the final manuscript.

7.5. Ethics approval and consent to participate

The Institutional Review Board of Tehran University of medical sciences approved the study (IR.TUMS.IKHC.REC.1400.302).

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Table 1: Describing situational awareness (SA) dimensions and examples of quotes corresponding to extracted behaviors of the trauma team SA regarding multiple trauma patients

Behavior dimensions	Examples of quotes
Allocate Resources Effective use of all team members to perform tasks as well as access to the necessary equipment	"The surgery resident anxiously transfers the patient from the emergency room to the operating room before having been stabilized. A leader needs to be appointed first; then he/she assigns tasks. Sometimes the neurosurgeon insists on performing a head CT scan before transferring the patient to the operating room." "Take intubation for instance. Everyone can do it, but there is always a person who can do it better. It is advisable that those who are not experts leave the task to the most skilled person to avoid causing iatrogenic damages and making the situation worse." "As soon as the trauma code is announced, all the necessary equipment (such as the airway) should be prepared before the patient enters the shock room." "The team leader calls someone to obtain a good IV line for the patient." "A surgical resident leaves the trauma room to resuscitate another patient coded in the ward, but other team members are unaware of this."
Anticipate and Plan Inform team members of the patient's leading position and potential needs and prepare for what will be needed	"Here are examples of what we explicitly announce to the other team members: the patient has low blood pressure so we asked for uncross-matched blood transfusions; we are going to intubate the patient; we inserted a chest tube in the left hemithorax; there is a hemothorax on the left side but we are going to obtain an imaging before we insert a chest tube; the patient's sonographic exam is positive." "Due to heavy bleeding, it would probably be necessary to transfuse a lot of blood and fluids, so put them in the warmer."
Avoid Fixation Errors Use all information to revise the diagnosis or schedule as needed	"The patient's unresponsiveness to stimulation is attributed to the use of sedatives for an intubating patient, who later turns out to be suffering from an epidural hematoma." "The patient in shock has several fractures in the legs and arms, the orthopedic surgeon, based on her experience, insists that these fractures are the cause of the patient's low blood pressure. Further evaluation reveals that the patient has a ruptured spleen as well. "
Call for help when needed Awareness of the team of the need for the necessary expertise to address the patient's current condition and requesting the necessary help or support from other specialists	"....We are not sure about the result of the point of care ultrasound, and we are getting help from a radiologist."
Prioritize attention With so much information simultaneously, team members decide to focus on information that will change over time.	"Given that several patients will be entering at the same time, the previous patients will be sent out of the trauma room so that there is enough space...As soon as the Trauma Code is announced, all people who are not directly involved in the care of the patients, including the patient's companions are asked to leave the room. A member of the team provides the necessary information to the patient's companions and informs them of the patient's condition."
Reassess patient Awareness of team members of dynamic changes in the patient's clinical condition to decide on diagnosis and treatment	"In a previously normotensive patient, the orthopedic surgeons warn that the distal limb pulse in the broken leg is impalpable. Reassessment of the vital signs reveals that the patient is at present hypotensive and that the peripheral pulses are weak or impalpable throughout the body."
Shared mental model Keep all team members up to date on what has happened, what is happening, and what will happen.	The team leader announces that "The patient has no airway or breathing problems but is in shock, and no source of external or intra-abdominal bleeding has been found so far." The team leader announces that "The result of the patient's abdominal ultrasound is positive. The patient may have a pelvic fracture and posterior peritoneal bleeding."

CT: computed tomography; IV: intravenous.

Table 2: Characteristics of studied participants

Specialty	NGT meeting		NGT voting step	
	Number (M/F)	Experience*	Number (M/F)	Experience*
Emergency medicine	5 (3/2)	12 ± 5.05	4 (2/2)	12.5 ± 5.54
Surgery	5 (4/1)	9.4 ± 5.31	4 (3/1)	6.75 ± 0.43
Anesthesia	5 (5/0)	10.8 ± 3.65	4 (4/0)	10.5 ± 4.03
Orthopedics	2 (2/0)	9.0 ± 5.65	1 (1/0)	5.0 ± 0.00

Data are presented as mean ± standard deviation. M: male; F: female; NGT: nominal group technique. *: year.

Table 3: Numbers of team situational awareness behaviors generated and agreed upon during the nominal group technique by dimensions

Behavior dimensions	Generated behaviors		Agreed-upon behaviors	
	Desirable	Undesirable	Desirable	Undesirable
Allocate resources	9	2	8	0
Anticipate and plan	5	3	3	2
Avoid fixation errors	3	4	3	4
Call for help when needed	2	0	2	0
Prioritize attention	2	2	1	1
Reassess patient	2	0	2	0
Shared mental model	4	0	3	0
Total	27	11	22	7

Data are presented as number.

Table 4: The levels of agreement (behavior's importance) per team situational awareness behaviors

Dimensions*		Behaviors	Agreement Level	
			(%)	Mean (SD)
		1. Addressing each team member with a requested task	100	4.30±0.11
		2. Assigning tasks to the right person(s) with relevant expertise	100	4.46 ±0.51
		3. Assigning tasks to the most qualified person(s) for the role	69.23	3.69 ±1.18
1	Desirable	4. Giving orders to the specific individual(s) if needed	78.58	4.07 ±0.64
		5. Allocating an alternative individual(s) to do the required task if needed	100	4.53 ±0.51
		6. Commanding other teammates to perform sequential actions	84.62	4.23 ±0.92
		7. Activating the trauma code	86.62	4.30 ±0.75
		8. Assessing the initial patient condition	86.62	4.30 ±0.75
		9. Checking necessary equipment for monitoring and diagnosis	100	4.61 ±0.50
	Undesirable	10. Not notifying team members that one of the members is leaving	69.23	3.53 ±1.12
		11. Not assigning tasks to the specific individual(s)	61.54	3.53 ±0.87
		12. Announcing needs or treatment modalities, including patient transfer	84.62	4.07 ±0.64
		13. Announcing clinical findings and corresponding therapeutic interventions	92.30	4.23 ±0.59
	Desirable	14. Preparing facilities and required drugs before performing the procedure	100	4.46 ±0.51
2		15. Passing on recorded information to the others	53.85	3.76 ±0.83
		16. Obtaining information about the accident scene	69.23	3.76 ±0.59
		17. Preparing equipment and medications with a delay	92.30	4.07 ±0.75
	Undesirable	18. Not receiving reports from EMS personnel and/ or accompanying people	69.23	3.69 ±1.18
		19. Avoiding announcing readiness to act before performing the procedure	84.62	4.38 ±0.76
		20. Suggesting possible alternative diagnoses or differential diagnosis	92.30	4.30 ±0.63
	Desirable	21. Considering inconsistent information	76.92	4.00 ±0.70
		22. Using new data to consider other clinical diagnoses	92.30	4.46 ±0.66
3		23. Insisting and emphasizing diagnostic or therapeutic measures related to the team member's specialty	84.62	4.07 ±0.86
	Undesirable	24. Emphasizing other teammates' expertise in diagnostic or therapeutic actions	92.30	4.15 ±0.55
		25. Making decisions without considering all available information	92.30	4.15 ±1.06
		26. Insisting on performing the procedure of their choice in case of unnecessary	92.30	4.53 ±0.66
	Desirable	27. Consulting senior resident	92.30	4.53 ±0.66
4		28. Consulting other specialties as needed	76.92	4.30 ±0.85
	Undesirable	—-		
	Desirable	29. Preventing and minimizing distractions by the team leader	92.30	4.38 ±0.65
5		30. Controlling environmental and systemic factors	69.23	3.76 ±0.83
	Undesirable	31. Managing the multi-trauma patient by non-related activities	61.53	3.76 ±1.09
		32. Direct engagement to accomplish teammates' tasks by the team leader	92.30	4.38 ±0.65
	Desirable	33. Assessing and reporting changes in patient condition	100	4.61 ±0.50
		34. Enquiring about changes in patient condition	84.62	4.07 ±0.64
	Undesirable	——		
		35. Reviewing patient's condition from the beginning of the trauma code	84.62	4.30 ±0.75
7	Desirable	36. Reviewing all suggested and conducted measures	84.62	4.07 ±0.64
		37. Reviewing explicitly the differential diagnoses	69.23	3.92 ±0.75
		38. Sharing all information and the anticipated course with team members	84.62	4.07 ±0.64
	Undesirable	——		

*: the list of dimentions are presented in table 3. TSA: team situational awareness; SD: standard deviation; EMS: emergency medical service.