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Design and implementation of a “crisis resource management” training program for the initial assessment of polytrauma patients

Diseño e implementación de un programa de aprendizaje *crisis resource management* para la evaluación inicial del paciente politraumatizado

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Abstract

Objective: To describe the design and implementation of a Crisis Resource Management (CRM) training program for the initial assessment of polytrauma patients.

Design: Prospectively implemented CRM training program.

Setting: Acute-care tertiary hospital in Sabadell, Barcelona, Spain.

Participants: Hospital personnel involved in the care of polytraumatism.

Interventions: The program has a blended format and 23-hour duration, including 11 hours of online theoretical training followed by 12-hour simulation modules and practical cases devoted to the roles of members of the trauma team, functioning of the polytrauma room, and key aspects of teamwork. The Human Factors Attitude Survey (HFAS) was used to assess attitudes related to non-technical skills, and the End-of-Course Critique (ECC) survey to evaluate satisfaction with training.

Main outcome variables: Changes in the pre- and post-training assessments.

Results: Eighty staff personnel (26% specialists, 16% residents, 29% nurses, 14% nursing assistant, 15% stretcher bearer) participated in three editions of the program. Theoretical knowledge improved from a mean (SD) of 5.95 (1.7) to 8.27 (2.1) ($p < 0.0001$). In the HFAS, statistically significant differences in 18 of 23 attitudinal markers were observed, with improvements in all items of “leadership” and “roles”, in 4 of 5 items of “situational awareness”, and in 4 of 8 items of “communication”. Mean values obtained in the ECC questionnaire were also very high

Conclusions: A CRM training model developed for the initial care of polytrauma patients improved theoretical knowledge and participants perceptions and attitudes regarding leadership, communication, roles, and situational awareness of members of the trauma team.

Keywords: polytraumatism, team training, crisis resource management, leadership, teamwork.

Resumen

Objetivo: Describir el diseño y la implementación de un programa de formación basado en *Crisis Resource Management* para la evaluación inicial de los pacientes con politraumatismos.

Diseño: Implementación prospectiva de un programa CRM de formación.

Ámbito: Hospital terciario en Sabadell, Barcelona, España.

Participantes: Personal del hospital involucrado en la asistencia de politraumatismos.

Intervenciones: El programa tenía un formato semipresencial de 23 horas de duración, incluyendo 11 horas de formación online de contenido teórico seguidas de 12 horas de módulos de simulación y casos prácticos referidos a los papeles de los miembros del equipo de trauma, funcionamiento del box de trauma y aspectos claves del trabajo en equipo. El *Human Factors Attitude Survey* (HFAS) se utilizó para evaluar las actitudes relacionadas con las habilidades no técnicas y el *End-of-Course Critique* (ECC) cuestionario para valorar la satisfacción con la formación.

Variables de interés principales: Cambios en las evaluaciones antes y después de la formación.

Resultados: Ochenta miembros del hospital (26% especialistas, 16% residentes, 29% enfermeras, 14% auxiliares de enfermería, 15% camilleros) participaron en tres ediciones del programa. El conocimiento teórico aumentó de una media (DE) de 5.95 (1.7) a 8.27 (2.1) ($p < 0,0001$). En el HFAS, se observaron diferencias estadísticamente significativas en 18 de los 23 marcadores de actitud, con mejorías en todos los ítems de "liderazgo" y "roles", en 4 de los 5 ítems de "consciencia situacional" y en 4 de los 8 ítems de "comunicación". Los valores medios obtenidos en el cuestionario ECC también fueron muy altos.

Conclusiones: Un modelo CRM de formación desarrollado para la atención inicial de los pacientes con politraumatismos mejoró el conocimiento teórico y las percepciones y actitudes de los participantes relacionadas con el liderazgo, la comunicación, los roles y la consciencia situacional de los miembros del equipo de trauma.

Palabras clave: politraumatismos, formación de equipo, crisis resource management, liderazgo, trabajo en equipo.

Introduction

Medical errors are inherent features of any procedure or medical intervention, and it has been claimed that around 100,000 people in the U.S. die every year from medical errors.¹ A substantial percentage of these errors are caused by factors related to non-technical skills (NTS), encompassing interpersonal skills (e.g. communication, leadership, teamwork) and cognitive skills (e.g. situation awareness, decision making).^{1,2} It has been argued that Medicine presents parallels with high-hazard industries, mainly the aerospace sector, where since the 1970s training in NTS has been prioritized through Crew Resource Management programs.^{1,3} In the 1990s, Gaba et al.⁴⁻⁶ coined the term Crisis Resource Management (CRM) and adapted real-life simulation training programs to help acquire and develop skills in resource management and decision making during crises in practice. The set of principles dealing with cognitive and interpersonal behaviors that contribute to optimal team performance and decision making are especially useful for acute care specialties, such as critical care, emergency medicine, and anesthesiology in which healthcare professionals must treat severely ill patients, while facing diagnostic ambiguity, resource limitations, safety challenges, and numerous disruptions in turbulent work environments.⁷⁻⁹

The care of polytrauma patients meets all the criteria to benefit from CRM programs.¹⁰ Standard training programs for polytraumatized patients, such as Advanced Trauma Life Support (ATLS®), have structured patient management undertaking primary and secondary assessments and constant reevaluation, but are focused on individual participants rather than considering that current care is provided by large and complex multidisciplinary teams.¹¹ Although adequate individual work performance is essential to the medical team, skills in group dynamics are necessary to complete tasks efficiently in critical dynamic situations.^{7,11} In the last decade, some initiatives have been developed to ensure acquisition of NTS for the modern care of polytrauma patients, such as the Canadian nationwide Standardized Trauma and Resuscitation Team Training (S.T.A.R.T.T.),¹² based on the implementation of CRM in multidisciplinary trauma teams showing a high level of participants' satisfaction and increased team performance.¹³ In the 10th edition of the ATLS®, a new teamwork

section at the end of each chapter has been added as well as an appendix of trauma team resource management.¹⁴

Formal education of the medical team and a structured feedback have been recognized as effective approaches for improving group dynamics.³ Also, there is increasing evidence that developing simulations in CRM training programs can improve communication within the team, distribution of tasks, and the subjective level of stress.^{1,15} In this respect, the Agency for Healthcare Research and Quality (AHRQ) has developed the TeamSTEPPS[®],^{16,17} an evidence-based teamwork system promoting integration of NTS to the delivery of quality health care and to preventing and mitigating medical errors and patient injury and harm.¹⁸

In 2017, the service of anesthesiology and resuscitation of a tertiary care reference hospital in Sabadell, Catalonia (Spain) promoted the implementation and evaluation of a specific CRM training program for the trauma team involved in the initial care of polytrauma patients, aimed to reinforce through theoretical concepts and simulation scenarios the clinicians' knowledge and skills in trauma practice. The objective of the present study was to assess changes in knowledge acquisition and attitudes towards the importance of human factors after implementation of the CRM course for the care of severely injured patients.

Material and methods

Study design and setting

A specific CRM training program for the medical team involved in the initial care of polytraumatized patients was designed, and included in the internal training activities of the hospital since 2018. Our center, Corporació Sanitària Parc Taulí is an 860-bed tertiary care teaching hospital located in the city of Sabadell (≈220,000 inhabitants, 2021 census), 20 km north of Barcelona in Catalonia (Spain). Approximately 550 polytraumatized patients are attended each year, 160 of which require admission to the intensive care unit (ICU).

CRM training program

The program was designed according to the S.T.A.R.T.T. training model^{12,13} and the

integration of the principles of CRM to team dynamics as outlined in the Trauma Crisis Resource Management Manual of Gillman et al.¹⁹ The course was designed and taught by medical experts in the care of polytraumatized patients and instructors in clinical simulation. It has a blended format and 23-hour duration, including 11 hours of online theoretical training, in which previous knowledge of participants was evaluated, followed by modules of classes and visualization of practical cases devoted to the roles of members of the trauma team, functioning of the polytrauma room, and key aspects of teamwork, such as leadership, roles, communication, and situational awareness.

Simulation training was performed using a SimMan 3G mannequin (Laerdal Medical Ltd., Orpington, UK) in an adapted environment simulating a trauma room for the care of polytraumatized patients. Participants attended 12-hour simulation training and were divided into groups of 7 persons, with the actual distribution of places of a trauma team of our center (1 team leader, 1 anesthesiologist, 1 general surgeon, 1 traumatologist, 2 registered nurses, 1 nursing assistant, and 1 stretcher bearer). Each practical session was performed by the two groups, each one performing a total of 5 simulation exercises and debriefings of eight exercises (the final exercises or exam did not have debriefings) as well as attending the exercises of the other group.

Three clinical scenarios were designed, including pelvic trauma and devastating injuries of the lower extremity, severe cranioencephalic traumatism with associated thoracic trauma, and abdominal traumatism. These three scenarios were designed in such a way that participants should worked on transfer of the patient to the medical emergency service, request of complementary studies, establishment of tentative diagnoses, emergent treatments, and patient's transfer to other services. The first scenario was used as baseline and final simulation activity, whereas the second and third scenarios were worked on in three different exercises by the groups of participants. In the first scenario, each participant assumed his/her real role, but in the second scenario, an exchange of roles was carried out within the same group with new roles were assigned by the teaching team, aimed at knowing different workloads and encouraging cross-monitoring and cooperation. Also, distracting factors were added (e.g. difficult intravenous access, the stretcher bearer leaving the trauma room for having finished the shift). In the third exercise, the team assumed the clinical scenario in which they had not been directly worked in the previous exercises, but they were

attended debriefing of the other group; in this case, simulation with a blinded leader was carried out in order to improve intragroup communication.

Data collection

Changes in the acquisition of knowledge based on the online theoretical training was evaluated using a multiple-choice 16-item questionnaire, which was designed ad hoc for the purpose of CRM training and had to be completed by participants before and after training. Each item had five alternative answers, of which exactly one was correct. Correct answers were score "1" and the final sum was divided by 16 and multiplied by 10, with a final score ranging between 0 and 10. Details of the questionnaire are available in the Supplementary material.

The Human Factors Attitude Survey (HFAS) was used to assess changes in attitudes related to team behavior emphasized in each module of the CRM training program (communication, leadership, roles, and situational awareness). This instrument was modified from an aviation-based attitudinal survey developed by the University of Texas and NASA,²⁰ and has been used in other studies to assess team behavior and communication among healthcare professionals.^{18,20,21} The HFAS has a total of 23 items and is characterized by good internal reliability (Cronbach's alpha = 0.89). Participants were asked to indicate their agreement with each question on a 5-point Likert scale, with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The survey was administered before and after simulation training. All questions were adapted to the care of polytrauma patients and were reviewed by expert doctors and nurses for content and applicability to the study. Participants completed a 12-question End-of-Course Critique (ECC) survey designed to assess the perceived need for training, usefulness of CRM skill sets, and satisfaction with CRM training. The score of each question was also evaluated using a 5-point Likert scale. All questionnaires were anonymous. Data of the professional profile of participants were also recorded.

The study was approved by the Clinical Research Ethics Committee (CEIC) (code 2018513, approval date February 11, 2018). Written informed consent was obtained from all participants.

Statistical analysis

Categorical data are expressed as frequencies and percentages, and continuous data as mean and standard deviation (SD). The Mann-Whitney U test for independent samples was used to assess differences between pre- and post-training changes. Statistical significance was set at $p < 0.05$. Data analysis was performed using the SPSS software program (version 23.0) for Windows.

Results

Between January and December 2018, three editions of the CRM training course for polytrauma patients were carried out, with a total of 80 participants (68.7% women). The professional profile of participants is shown in Table 1. Twenty-one (26%) participants were specialists, 13 (16%) residents, 23 (29%) registered nurses, 11 (14%) nursing assistants, and 12 (15%) stretcher bearers.

Theoretical knowledge after the online training improved from a mean of 5.95 (1.7) to 8.27 (2.1) points ($p < 0.0001$). Analysis of the HFAS responses revealed statistically significant improvements in 18 of 23 attitudinal markers (Table 2). In the domains of “leadership” and “roles”, pre- and post-training comparisons for all questions were statistically significant. The two questions of the survey corresponding to “roles” achieved the highest post-training scores, with a mean of 4.85 (0.46) for “Prior to the procedure, it is important for all the team members to be familiar with the tasks and responsibilities of the other members of the team” and 4.83 (0.57) for “Team leader and team members can improve decision-making skills through training”. However, most of the questions corresponding to “leadership” were those with more marked pre- and post-training differences. The analysis of attitudes of the 8 questions regarding “communication” showed statistically significant differences in 4, whereas there were no significant changes in the remaining 4, particularly the question “The set-up process for a trauma (gown & glove, set up equipment) negatively affects communication” showed the lowest non-significant change, from a mean of 2.59 (1.63) to 2.84 (1.26).

In relation to the final assessment of the perceived usefulness and satisfaction with the CRM training program, mean values obtained in the ECC questionnaire were

very high (Table 3). The percentages of responses for a maximum score of 5 (strongly agree) ranged between 93.4% and 99% (Table 3).

Discussion

Implementation of the CRM training program focused on the initial care of polytrauma patients was associated with an improvement of NTS in the areas of leadership, roles, and situational awareness, as well as a significant improvement in the theoretical knowledge of human factors. In 1999, the publication of “To Err is Human: Building a Safer Health System” by the Institute of Medicine²³ emphasized the role of human errors in the clinical setting and proposed the application of crew CRM team-building communication process of the aviation industry to improve safety. Although specific training programs in polytraumas are starting to highlight the human factor as a key aspect in the management of polytrauma patients,¹⁴ most emergency medicine caregivers currently receive not formal CRM training.³ CRM objectives enhance communication for all team members, use of resources, situational awareness, leadership, and team strategies.¹ Similar to other programs, such as the Canadian S.T.A.R.T.T.,¹ the aim of our course was not to replace specific training on the management of polytraumas, rather than to apply CRM principles in the care of polytrauma patients in the trauma room setting following ATLS® management guidelines.¹⁴ Although CRM training programs should be tailored to the characteristics and dynamics of each center, it is beneficial for multidisciplinary teams to train together for increasing team cohesiveness at work, a critical factor to patient safety.^{1,14} To this purpose, the anesthesiology service of our hospital proposed the implementation of a multidisciplinary training activity aimed to improve knowledge and attitudes in NTS of the team members involved in the initial care of polytrauma patients.

CRM training using simulation strategies provides a more realistic environment than the traditional classroom.¹ In our program, the design of the different scenarios included exercises to work on specific aspects of CRM, including the exchange of roles¹⁸ and the introduction of distractors, which allowed to enhance situational awareness. The HFAS instrument was used to assess level 1 (reaction) of the Kirkpatrick’s four levels of training evaluation model.²⁴ In agreement with previous

studies,²¹ we found a positive improvement of attitudes in the leadership domain. Of note, the assignment of roles, the creation of mental models by the team leader and sharing them with the group, the importance of debriefing after the case and, very relevantly, accepting that assertive discussion about different therapeutic options between the leader and the team members empowers the team to solve cases more efficiently. These changes make the team feel integrated, so that each member knows clearly his/her functions and participates at all times in the evolution of the patient's clinical condition, regardless of their professional category. Therefore, it is essential that leadership should be understood as a group property, which will empower the team in the patient's care, to communicate critical situations, and to participate in decision-making and management of information (*without followers, there can be no leaders*).

In contrast to other studies,²¹ we found an improvement in post-training scores in the questions related to "roles", a finding that may be attributed to the exercises of the exchange of roles, which allowed to obtain a positive shift for a better knowledge of each member's function within the team, the need to be familiar with other roles, and improvement of performance of the trauma team associated with training. All of these contributed to a better understanding of workloads and responsibilities of other team members, which can reduce pressure and stress increasing patient safety. There was also a significant improvement in all items related to "situational awareness" except for the opinion that individual performance is not adversely affected by the fact of working with less experienced personnel. In contrast to other studies,²¹ the importance of being present in the briefing process was positively evaluated. The use of distractors in the simulation exercises probably contributed to alert participants on the need to ensuring performance and to be focused on the case before the patient's arrival to avoid adverse events.^{18,21}

In relation to the "communication" section, results obtained were similar to those reported in other studies.^{21,25} There was a significant improvement in the need of training to speak up when team members seem something that is not going right and to speak aloud when a problem with the patient is perceived independently of who team member is. Improvements in other items, such as the number of persons in the trauma room, the noise level, or the quality of communication before arrival of the

patient were not observed, probably because pre-training scores were already high as participants perceived communication as a relevant issue affecting the quality of care. On the other hand, responses to the ECC survey regarding the usefulness of CRM training were very favorable, with highest scores in those items related to safety and reduction of errors. Participants considered that training would be associated with an attitudinal change improving performance, an effect that was not reported in previous studies.¹⁸

The distribution of the professional profiles of participants was directly related to the actual trauma members in our hospital, with multidisciplinary as one of the key of success.³ There are CRM training courses in which participants do not conform real teams, which diminishes credibility of simulation. In our program as well as in the study of Ziesmann et al.,¹ all participants were at the same level regardless of their professional category, training, or previous experience, so that performance of each team member was as much realistic as possible.

Finally, the number of participants in the CRM training courses was limited and the impact of positive reactions and attitudes on other levels of training evaluation, such as behavior and results were not analyzed.

Conclusion

A CRM training model developed for the initial care of polytrauma patients improved theoretical knowledge and participants perceptions and attitudes regarding leadership, communication, roles, and situational awareness of members of the trauma team.

Authors' contributions: N. Alegret: design, principal investigator, collection, analysis and interpretation of data, writing of the manuscript. A. Valle: design and data collection. L. Subirana, S. Fuentes and S. Montmany: data collection. R. Valero: design, interpretation of data, critical review. All authors have seen and approved the final draft.

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Appendix A. Supplementary data

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Table 1. Professional profile of 80 participants in the CRM training program

Profile	Number (%)
Specialist physician	21 (26)
Anesthesiology	13 (62)
Traumatology and orthopaedic surgery	3 (14)
Pediatric surgery	2 (10)
General surgery	1 (5)
Intensive care medicine	1 (5)
Pediatrics	1 (5)
Resident physician	13 (16)
Anesthesiology	5 (38)
General surgery	4 (31)
Traumatology and orthopaedic surgery	3 (23)
Intensive care medicine	1 (8)
Registered nurse	23 (29)
Nursing assistant	11 (14)
Stretcher bearer	12 (15)

Table 2. Pre- and post-training results of the Human Factors Attitude Survey

Survey question	Pre-training mean (SD)	Post-training mean (SD)	P value
1. Relevant information regarding the incoming trauma is provided by the personnel of medical emergencies before arrival of the patient	3.85 (1.24)	4.53 (0.60)	0.001
2. The team leader is identified to the personnel of medical emergencies	3.79 (1.25)	4.67 (0.55)	< 0.001
3. Prior to the procedure, it is important for all the team members to be familiar with the tasks and responsibilities of the other members of the team	4.05 (1.19)	4.85 (0.46)	< 0.001
4. The team leader obtains relevant information from personnel of medical emergencies	4.28 (0.88)	4.63 (0.51)	0.013
5. The team leader identifies him/herself to the team members	3.83 (1.14)	4.73 (0.55)	< 0.001
6. My performance is not adversely affected by working with an inexperienced or less capable team	3.00 (1.26)	3.25 (1.36)	0.216
7. Team leader and team members can improve decision-making skills through training	4.58 (0.64)	4.83 (0.57)	0.001
8. My ability to detect adverse situations has a direct relationship to the quality of decisions I make	4.01 (0.89)	4.52 (0.64)	< 0.001
9. It is important for me to be involved in a briefing before the patient arrives	4.20 (0.95)	4.77 (0.45)	< 0.001
10. I know what I am expected to do during a trauma before bedside care begins	4.14 (0.86)	4.51 (0.53)	0.006
11. The team leader communicates a plan for the patient before the patient arrives	3.28 (1.21)	4.52 (0.68)	< 0.001
12. The team leader assigns roles before the patient arrives	3.06 (1.18)	4.33 (0.81)	< 0.001
13. In response to a critical unplanned event, the team leader should verbalize plans and ensure that the information is understood by all team members	3.53 (1.25)	4.47 (0.72)	< 0.001
14. The quality of communication before the patient arrives improves bedside care	4.68 (0.57)	4.82 (0.39)	0.253
15. A discussion of alternative methods does not make the team leader appear indecisive	3.59 (1.1)	4.35 (0.82)	< 0.001
16. The number of persons in the trauma room negatively affects communication	4.54 (0.82)	4.62 (0.81)	0.411
17. The noise level in the trauma room negatively affects communication	4.70 (0.68)	4.80 (0.69)	0.082
18. I know the patient's level of severity, mechanism of injury and relevant patient information before patient arrives	3.60 (1.07)	4.30 (0.79)	< 0.001
19. A constructive debriefing after the event is a crucial part of maintaining and developing effective team coordination	4.35 (0.96)	4.72 (0.48)	0.017
20. The set-up process for a trauma (gown & glove, set up equipment) negatively affects communication	2.59 (1.63)	2.84 (1.26)	0.236
21. When there are simultaneous traumas, roles of caregivers are assigned before patient arrives	3.52 (1.26)	4.28 (0.81)	< 0.001
22. If I perceive a problem with the patients, I say it loudly, independently regardless of the team member affected	3.57 (1.21)	4.17 (0.85)	0.002
23. The staff taking care of a polytrauma patient need training to "speak up" when they see something that is not right	4.25 (0.88)	4.58 (0.65)	0.017

Questions 1, 13, 14, 16, 17, 20, 22, and 23 are related to "communication"; questions 2, 4, 5, 11, 12, 15, 19, and 21 are related to "leadership"; questions 3 and 7 are related to "roles"; and questions 6, 8, 9, 10, and 18 are related to "situational awareness". Likert scale used: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree; SD: standard deviation.

Table 3. Results of End-of-Course Critique (ECC) survey at the end of the CRM training

Questions	Mean (SD)	Percentage of responses over a maximum of 5 score*
1. I had the need for this training/information	4.76 (0.43)	95.2
2. CRM training provided me with knowledge and/or skills	4.81 (0.43)	96.2
3. This training has the potential to increase patient safety and quality care	4.95 (0.22)	99
4. This training was useful to reduce errors in your practice	4.90 (0.34)	98
5. Is "leadership" training useful?	4.85 (0.40)	97
6. Is "situational awareness" training useful?	4.84 (0.41)	96.8
7. Knowing the roles of the team members and the distribution of material in the trauma room improves my performance	4.92 (0.27)	98.4
8. The team leader and team members may improve their skills with training	4.91 (0.29)	98.2
9. My ability to detect adverse situations has a direct relationship with the quality of decisions that I take	4.67 (0.52)	93.4
10. For me, it is important to be present in the briefing before arrival of the patient	4.85 (0.40)	97
11. Knowing the different communication tools is useful in my daily practice	4.78 (0.47)	95.6
12. This training will change the way I do things	4.80 (0.40)	96

CRM: crisis resource management; SD: standard deviation; *5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Supplementary material**Questionnaire for the assessment of knowledge acquisition**

For all items, select only one response

1.- The Crisis Resource Management (CRM) concepts recently applied to medicine from which field they come:

- a. The oil industry.
- b. Civil aviation.
- c. The army.
- d. They have been developed by the Ministry of Health.
- e. None is true.

2.- Crisis Resource Management (CRM) works with concepts related to:

- a. Communication.
- b. Situational awareness.
- c. Leadership.
- d. Knowledge of the different roles of the team.
- e. All of the above are true.

3.- In our setting, who is the person that coordinates the different teams and establishes communications with the different services or areas to transfer the patient to?

- a. Emergency coordinator.
- b. General surgeon.
- c. Registered nurse #1.
- d. Team leader.
- e. None of the above.

4.- Which of the following tasks DO NOT correspond to a registered nurse #1:

- a. Checklist of the airway material before the patient arrives.
- b. Basic monitoring of the patient.
- c. Accompany the patient to CT scan.
- d. Prepare the material for thoracic drainage.
- e. Provide the airway material to the anesthesiologist.

5.- Which of the following tasks DO NOT correspond to registered nurse #2:

- a. Prepare medication before the patient arrives.
- b. Perform blood sampling.
- c. Make the checklist of transfer material.
- d. Accompany the patient to CT scan.
- e. Prepare the trauma room for the next assistance.

6.-In our center, the TRAUMA POOL include:

- a. 4 red blood cell concentrates and 1 bag of plasma.
- b. 5 red blood cell concentrates, 1 bag of plasma and one pool of platelets.
- c. 4 red blood cell concentrates 1 bag of plasma and 2-4 g of fibrinogen.
- d. 5 red blood cell concentrates, 1 pool of platelets and 2-4 g of fibrinogen.
- e. 4 red Blood cell concentrates, 1 pool of platelets and 1 bag of plasma.

7.- At the time of the patient's transfer to the ICU:

- a. He/she must be transfer as quickly as possible.
- b. He/she should be transfer with the team leader only.
- c. He/she should be transfer very carefully.
- d. He/she must be transfer safely with the litter carrier, a nurse and the team leader with a prior telephone notice.
- e. He/she must be transfer safely with the litter carrier, a nurse and the team leader.

8.- In case of a critical situation in which the TEAM LEADER has to be addressed to the team members, which of the orders would NOT be adequate:

- a. Dr Schneider intubate the patient and tell me the EtCO₂ values after intubation.
- b. Nurse Bauman performed a blood gas analysis and informed me of the excess base, lactate and hemoglobin.
- c. All medical students leave the resuscitation room.
- d. Resident Schneider make a call to prepare the operating room for the patient.
- e. All orders are performed adequately.

9.- Most communication deficiencies could be summarized as:

- a. We do not express what we think.
- b. What we say is not heard.
- c. We do not understand what we feel.

- d. A and B are true.
- e. A, B and C are true.

10.- Communication is more than what we say. Say which one is false:

- a. The facial expression participates in the communicative act.
- b. The tone of how we say things is very important.
- c. All communication must be in writing.
- d. Maintaining eye contact reinforces communication.
- e. Making emphasis on one part of the message helps to maintain attention.

11.- The best leaders are those who can adapt to different styles depending on the situation that requires it, please select the wrong answer:

- a. It is important that he/she recognizes his/her personality and how it affects the leadership style.
- b. Under no circumstances, an authoritarian or autocratic style should be adopted.
- c. He/she has to achieve the trust of the team for their support.
- d. He/she must know how to take advantage of the skills of all team members and focus on the WHAT and not the WHO. Hence the importance of getting to know the team members.
- e. He/she must shift the focus of attention between completing tasks and coordinating the team.

12.- Which of the following statements regarding the type of leadership is not true:

- a. Authoritarian or autocratic leadership is based on a transactional relationship.
- b. Democratic leadership is less productive than autocratic leadership but its contributions are of higher quality.
- c. A transformational relationship between team members does not require the need to inspire, motivate or create a shared vision in the team group since the team leader is the one who leads the team.
- d. Building the team in advance is a key factor to achieving a good transformational relationship.
- e. The leader with a delegation or letting go style is the least productive.

13. A good leader, select the incorrect response:

- a. He/she needs to take some time to assess the situation and not get carried away by his/her emotions.

- b. He/she needs to keep calm and motivate the team.
- c. Does not admit suggestions from the team if the level of stress is high.
- d. Recognize the importance of self-criticism.
- e. He/she achieves implicit coordination as the team matures.

14.- Read the following situation and answer the following questions about this case:

A burned female patient arrives at the polytrauma room with external injuries to the face, neck and chest, and with laryngeal stridor. It is decided to intubate her without success. The two assistant anesthesiologists try this on multiple occasions, without success and without being able to switch to another strategy. The other members of the trauma team, younger and less experienced, do not dare to intervene and alert them to their mistake. Tragically, the patient dies of severe cerebral anoxia.

1. What kind of error has occurred?

- a. Fixation error.
- b. Logistic error (lack of appropriate material).
- c. Technical error.
- d. All of the above
- e. No mistake, it can happen to anyone.

15.- Regarding the aforementioned case, which of the following statements is false?

- a. Situational awareness is divided into three levels: perception, synthesis, and projection.
- b. By creating a mental model, our brains accelerate both our understanding and our actions.
- c. One of the disadvantages of creating a mental model is the tendency to reject any new evidence that does not fit our mental model.
- d. The "team leader" of a polytrauma team should maintain vigilance in scanning.
- e. Creating a mental model prevents anticipation and planning.

16.- Which of the following is the correct?

- a. In stressful situations, our heart rate decreases.
- b. Training through the simulation of a critical situation does not improve performance in the face of a real critical situation.
- c. Stress is not associated with fixation errors.
- d. Each member of the trauma team is responsible for creating and sharing their own mental model (individual consciousness).

- e. In a stressful situation, there is no time to create a shared mental model (team consciousness), so it is better for the team leader to act according to his/her own mental model (individual consciousness).