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Communication during trauma resuscitation: do we know what is happening?

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Summary

Objective: Verbal communication is essential for teamwork and leadership in high-intensity performances like trauma resuscitation. We evaluated communication during multidisciplinary trauma resuscitation.
Methods: The main trauma room of a level one trauma centre was equipped with a digital video recording system. Resuscitations were consecutively and prospectively enrolled. Patients with revised trauma score (RTS) = 12 were resuscitated by a 'minor trauma team' and patients with RTS < 12 by a 'major trauma team'. Information transferral from physicians to other team members was evaluated separately for all ABCDE's, according to initiation, audibility and response. The observer was trained and the first 30 video's were excluded.
Results: From May 1st to September 1st 2003, 205 resuscitations were included, 12 were lost for evaluation. The 'major trauma team' resuscitated 74 patients (ISS:21.4). Communication was audible in 56% and understandable in 44% during the primary survey.

The 'minor trauma team' assessed 119 patients (ISS:7.4). Communication was audible in 43% and understandable in 33%.
Conclusions: Communication during trauma resuscitation was found to be sub optimal. This is potentially harmful for trauma victims. Professionals and institutions should be aware that communication is not self-evident. Introduction of an aviation-like communication feedback system could help to optimise trauma care.

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Introduction

Advanced trauma life support® (ATLS®)-based protocols are used throughout the world, and provide a common language and framework for trauma resuscitation.[1] Initially intended for a single resuscitator in a rural health care facility,[1] it reflects the historical education of doctors as independent professionals.[16] Currently, it is used in multidisciplinary settings as well. Communication is of the utmost importance in complex situations like multidisciplinary trauma resuscitation. Communication is essential for team dynamics, structure building, cooperation, task performance and leadership.[2,4,6,7] Failure of communication contributes to errors.[10] Aviation research has shown that optimal communication is needed for effective teamwork, which is essential to flight safety.[8] Communication during initial assessment of trauma resuscitation is not as clearly structured as in analogous, high-intensity professions such as aviation. For high quality patient care, it is essential that information acquired during assessment is transferred to all team members. To date, no objective evaluation of verbal communication during trauma resuscitation has been published.[18] This study sought to document information transferral from physicians to other team members during multidisciplinary trauma resuscitation. The study was approved by the hospital's institutional review board and all personnel involved were informed.

Methods

This observational study examined verbal communication during multidisciplinary trauma resuscitation. Resuscitations were prospectively and consecutively reviewed and evaluated in the period between May 1st and September 1st 2003. The study was performed at the emergency department of the Erasmus Medical Centre, a 1200+ bed university hospital in a major Dutch city. It acts as a level one trauma centre, serving a 2.5 million urban population. Pre-hospital vital signs were used to calculate the patients' triage revised trauma score (RTS).[3] Patients with a triage RTS of 12 were assessed and treated by the 'minor trauma team'. Direct patient care in this team was provided by a junior surgical resident, an emergency physician and a radiology resident. The surgical resident acted as the team leader and the team included two emergency nurses. Patients with an initial RTS < 12 were resuscitated by the 'major trauma team'. This team consisted of the 'minor trauma team', a senior surgical resident and a resident in anaesthesiology, and neurology. The senior resident surgery acted as the team leader and was supervised by an anaesthetist or a trauma surgeon. The 'minor trauma team' could be upgraded to a 'major trauma team' at any given time. We evaluated all consecutive resuscitations, primarily executed in the video equipped trauma room. The main trauma room was equipped with a continuous recording digital video system (Digital Sprite DX), because video enables objective measurements and mistakes are far less common than in eyewitness observation.[20] Digital recordings were used because picture and sound are of superior quality to analogue videotapes, and it prevents the well-known problem of forgetting to turn the video on.[12,15,19] A camera (Ademco Video AD3VC4X, 3) was placed over the foot of the bed, aimed at the patient to ensure optimal recordings of professionals and their actions, and to prevent recognition of the trauma patients. Another camera and a microphone were placed over the patient, recording only the vital parameters and sound. We used a microphone type Charles Goffin AT 845-R, with a sensitivity of 42 dB. This amply enabled recording volumes of normal conversation (60 dB). According to hospital policy, all recordings were erased after 72 h. Verbal

Table 1 Documented communication parameters in the trauma teams

Communication	Description	Reason
Absent	<42 dB	No effective communication with team members
Audible	Intervention	To indicate interference from outside the team
	Question to assessing physician, without response	Non-compliance with protocol, with unsuccessful attempt by the team to extract information
	Question to assessing physician, with response	Non-compliance with protocol, with successful attempt by the team to extract information
	Initiated by assessing physician, but not understandable	Attempt to comply with protocol, but unsuccessful
	Initiated by physician and understandable	According to protocol

dB, decibel.

communication during assessment of the airway, breathing, circulation, disability, exposure/environmental control and secondary survey was evaluated separately. We observed communication to and from physicians assessing patients during resuscitation; hereafter referred to as assessing physicians.

To enable adequate analysis of verbal communication, the help of a communication specialist was essential. To study such a large sample population, a limited number of categories were used to analyse verbal communication. Verbal communication was scored as being absent or audible. Audible communication was further subdivided as shown in Table 1. Composition of trauma teams varies on a day to day basis. Since team members only infrequently work with the same colleagues, non-verbal interaction/communication was not expected to be common. Because of this and possible difficulties in objective assessment, these forms of communication were not included in the analyses.

The observer was trained by a communication specialist and the evaluations of the first 30 resuscitations were excluded from calculations to avoid a possible learning curve. Communication was considered audible when detected by the microphone (>42 dB) and understandable, when understandable during video recording assessment. Handovers were defined as verbal interactions concerning the patient, from paramedics to the trauma team in the trauma room, prior to assessment.

TRISS was used to compare mortality with the literature.[5,17] All data were collected in a Microsoft Access® 2000 database. Results of both teams were compared to demonstrate differences in communication. To investigate the influence of injury severity on the level of communication during resuscitation, a subgroup analysis was performed for the resuscitations performed by the 'major trauma team' with an ISS below or above 25.[14] The primary outcome measure was the presence of audible information transfer from physicians to other team members during trauma resuscitation. Secondary outcome measures were the type of verbal communication and the presence of handovers. Results were presented as proportion or mean ± S.D., where appropriate. Analysis was performed using standard statistical tests in the Statistical Package for Social Sciences®, version 10.1. *P*-values of 0.05 and below were considered significant.

Results

We included 205 resuscitations in a 4-month period. Twelve resuscitations were lost to evaluation due to technical problems. The patient gender distribution was 73% males to 27% females, with an average age of 33 years. The 'minor trauma team' resuscitated 119 patients with an average ISS of 7.4. The presence of audible communication during initial assessment ranged from 16% during the exposure phase to 74% during assessment of Breathing (Table 2). Understandable communication ranged from 6% during exposure to 64% during breathing. Handovers were executed in 119 resuscitations (96%). The 'major trauma team' resuscitated 74 patients with an average ISS of 21.4. Audible communication during initial assessment in the 'major trauma team' ranged from 33% during the exposure phase to 83% during assessment of breathing (Table 2). Understandable communication ranged from 21% during secondary survey to 70% during breathing (Table 3). Handovers by paramedics were executed in 68 resuscitations (91%). There was less audible and understandable communication in the

Table 2 Presence of audible communication during trauma resuscitation in both teams

Audible communication					
ATLS® steps	Major trauma team (*n* = 74)		Minor trauma team (*n* = 119)		*P* = (chi-square)
	n	%	*n*	%	
A	31/73	43	49/118	42	0.90
B	61/74	83	87/118	74	0.16
C	45/70	64	58/116	50	0.06
D	37/71	52	40/116	35	0.02
E	20/60	33	18/114	16	0.01
Sec	16/28	57	35/84	42	0.15

ATLS®, advanced trauma life support®; A, airway; B, breathing; C, circulation; D, disability; E, exposure/environment; Sec, secondary survey.

Table 3 Presence of understandable communication during trauma resuscitation in both teams

Understandable communication					
ATLS® steps	Major trauma team (*n* = 74)		Minor trauma team (*n* = 119)		*P* = (chi-square)
	n	%	*n*	%	
A	28/73	38	44/118	37	0.88
B	52/74	70	76/118	64	0.40
C	41/70	59	46/116	40	0.01
D	24/71	34	32/116	28	0.37
E	13/61	22	7/114	6	<0.005
Sec	6/28	21	12/84	15	0.37

ATLS®, advanced trauma life support®; A, airway; B, breathing; C, circulation; D, disability; E, exposure/environment; Sec, secondary survey.

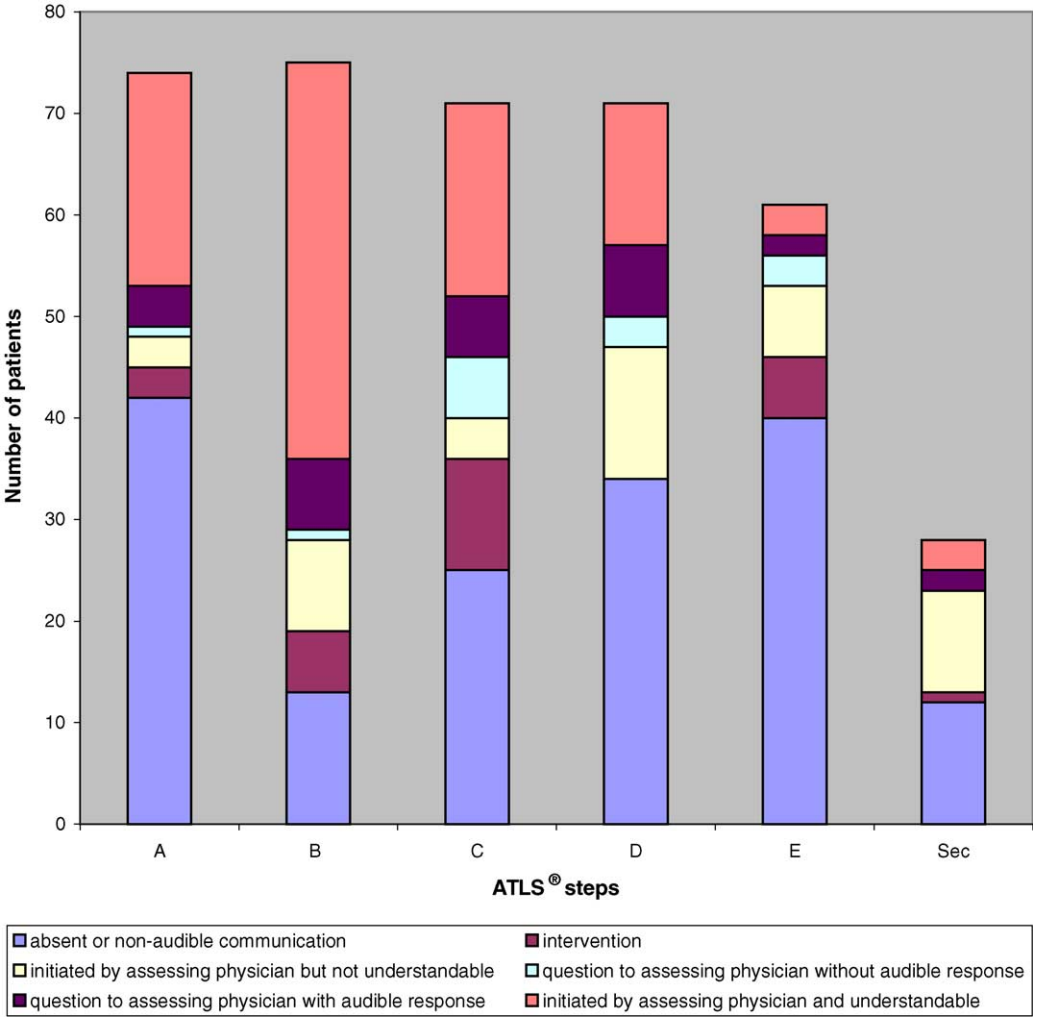

Figure 1 Analysis of communication present during trauma resuscitation in the 'major trauma team'. ATLS®, advanced trauma life support®; A, airway; B, breathing; C, circulation; D, disability; E, exposure/environment; Sec, secondary survey.

'minor trauma team' compared to the 'major trauma team', during assessment of circulation, disability and environmental control (Tables 2 and 3). Subgroup analysis in the 'major trauma team' however, does not reveal evident differences between resuscitations of patients with ISS $\geq$ 25 and $<$25.

Details of communication are shown in Figs. 1 and 2. Evident differences in the black columns, depicting the absence of communication, underline the differences in communication between both teams. The figures also depict that communication was less often initiated by the assessing physician and the more frequent interventions in the 'major trauma team'.

The 'major trauma team' resuscitated 32 patients with an ISS $\geq$ 25 and 39 with an ISS $<$ 25. The ISS of three patients could not be determined. Understandable communication during assessment of breathing in patients with an ISS $<$ 25 was 28/39 (72%), compared to 23/32 (72%) in the group with an ISS $\geq$ 25 (Table 4). During assessment of circulation, understandable communication was present in 22/37 (60%) patients with an ISS $<$ 25 and 18/30 (60%) of patients with an ISS $>$ 24. Audible communication was present during assessment of exposure in 5/34 (15%) of ISS $<$ 25 and 8/24 (33%) in ISS $>$ 24. Twelve people died in our population, with an expected mortality of 14.

Discussion

The purpose of this study was to observe verbal communication from physicians to other team members during trauma resuscitation. There was understandable information transfer from physicians to other team members in the 'major trauma team' in

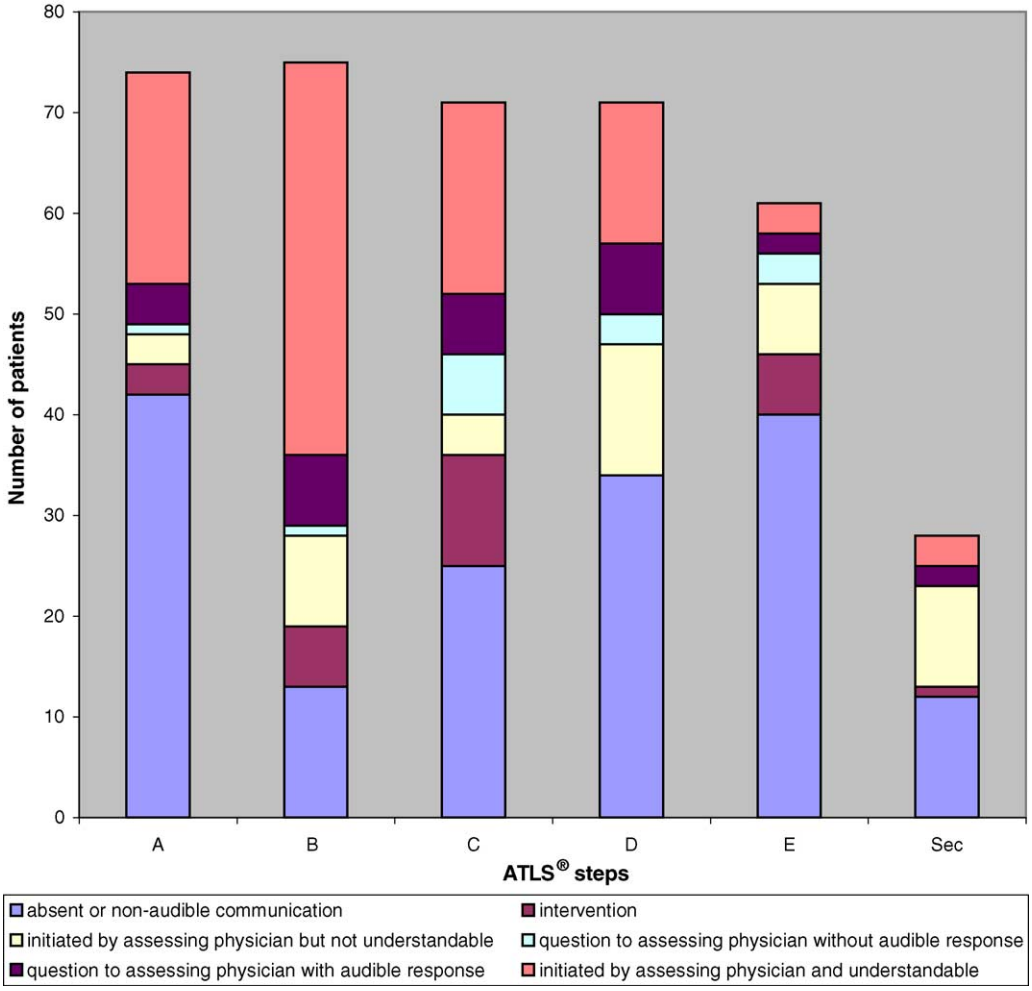

Figure 2 Analysis of communication present during trauma resuscitation in the 'minor trauma team'. ATLS®, advanced trauma life support®; A, airway; B, breathing; C, circulation; D, disability; E, exposure/environment; Sec, secondary survey.

Table 4 Presence of understandable communication in resuscitations by the 'major trauma team' in patients with an ISS < 25 and ≥ 25

Understandable communication in 'major trauma team'					
ATLS® steps	ISS ≥ 25 ($n = 32$)		ISS < 25 ($n = 39$)		P = (chi-square)
	n	%	n	%	
A	11/31	36	17/39	44	0.49
B	23/32	72	28/39	72	0.99
C	18/30	60	22/37	60	0.96
D	7/31	23	15/37	41	0.12
E	8/24	33	5/34	15	0.09
Sec	1/5	20	5/22	23	0.70

ATLS®, advanced trauma life support®; A, airway; B, breathing; C, circulation; D, disability; E, exposure/environment; Sec, secondary survey; ISS, injury severity score.

only 21—70% and 6—64% in the 'minor trauma team'. Communication during resuscitation by the 'major trauma team' was more diverse, and more frequently initiated by others than the assessing physician (Figs. 1 and 2). The same protocol is used, but there are differences in trauma population, structure of resuscitation, team composition, perceived stress and the presence of supervision. Comparing the two teams does not provide a comparison of equals, but does provide insight in communication during trauma resuscitation in general. To assess all communication during trauma resuscitation, we will conduct a qualitative study in the near future. This will also enable us to assess the level of power distance between disciplines during resuscitation.[11] Structured communication is more essential in the 'major trauma team', because group dynamics are more complex (Figs. 1 and 2), and consequences of

mistakes are likely to be more severe. The 38% understandable communication during ''Airway'' assessment deprives team members of the opportunity to anticipate tasks to come, like the preparation of medication for intubation. Overall, audible communication was more frequent in the 'major trauma team'. One could argue the need for communication during the exposure/environment in the 'minor trauma team', but it matches the results in other resuscitation steps. For both trauma teams, the lack of audible interaction concerning patient parameters is striking. This clearly shows the evident challenge to physicians and staff of adequate communication during the initial assessment and treatment of trauma victims. Severity of injury did not influence the understandable communication during assessment of breathing ($P = 0.99$) and Circulation ($P = 0.96$) in severely and moderately injured patients in the 'major trauma team' (Table 4). There was a trend towards better communication during the exposure of the severely injured patient ($P = 0.06$). Injury severity and the accompanying arousal by professionals, seems to influence communication on some levels, but fails to ensure optimal communication during the resuscitation of patients in need. This subgroup analysis gives an idea of the influence of injury severity on communication, but is limited by the relatively small number of resuscitations. Unlike communication during resuscitation, handovers from the paramedics to the trauma teams were performed in the vast majority of resuscitations.

Communication during resuscitation is a complex dance and this study provides insight by observing a small, essential part of communication. We did not evaluate communication outside the resuscitation room, non-verbal communication in the resuscitation room, task-allocation prior to resuscitation, or reactions to knowledge transferral. However, results clearly show the absence of knowledge transferral in the resuscitation room during numerous trauma resuscitations. Audible communication is needed for team dynamics, structure building, cooperation, task performance, leadership[2,4,6,7] and the prevention of errors.[10] Improvements in teamwork, and therefore communication can significantly enhance quality of emergency care. This is essential because it has been established that over half the deaths in US malpractice cases can be avoided by better teamwork.[13]

The high sensitivity of the microphone ensured that all communication in the room was recorded, but this does not mean that all recorded communication was effective. Effectiveness of communication is a legitimate question, but extremely difficult to measure objectively. Although voices are raised in the crash room on some occasions, effective communication does not arise spontaneously, but needs specific training.[13] This is illustrated by the fact that in our institution, supervision of the 'major trauma team' alone does not result in optimal communication (Table 3). The persistent sub optimal communication under supervision seems to illustrate a lack of feedback in the current communication and training system. Mortality shows that quality of trauma care in our institution was similar to results in literature; therefore, problems encountered might not be confined to our institution.

Conclusions

Communication during trauma resuscitation is not self-evident. Even with a trauma surgeon present, knowledge transferral from physicians to other team members is sub optimal. The ATLS® course provides guidelines for trauma resuscitation.[1] But, guidelines for communication are not as clearly structured as in analogous, high-intensity professions such as aviation.[8,9] To optimise the vital communication, there should be a ''spider in the web'', and awareness of the need for communication. Professionals and institutions should be aware that communication is not self-evident, and should focus on communication in quality improvement programmes. Introduction of an aviation-like communication feedback system can help to optimise trauma care.

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