The American Journal of Surgery xxx (2017) 1–5

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Why saying what you mean matters: An analysis of trauma team communication

Hee Soo Jung [a,*], Charles Warner-Hillard [a], Ryan Thompson [b], Krista Haines [a], Brooke Moungey [b], Anne LeGare [c], David Williamson Shaffer [d], Carla Pugh [a], Suresh Agarwal [a], Sarah Sullivan [a]

[a] Department of Surgery, University of Wisconsin-Madison, School of Medicine and Public Health, Madison, WI, USA
[b] Department of Emergency Medicine, University of Wisconsin-Madison, School of Medicine and Public Health, Madison, WI, USA
[c] University of Wisconsin Hospital and Clinics, Madison, WI, USA
[d] Department of Educational Psychology, University of Wisconsin-Madison, School of Education, Madison, WI, USA

ARTICLE INFO

Article history:
Received 10 May 2017
Received in revised form
7 September 2017
Accepted 4 November 2017

Keywords:
Trauma
Simulation
Verbal response modes
Speech acts
Communication
Non-technical skills

ABSTRACT

Background: We hypothesized that team communication with unmatched grammatical form and communicative intent (mixed mode communication) would correlate with worse trauma teamwork.
Methods: Interdisciplinary trauma simulations were conducted. Team performance was rated using the TEAM tool. Team communication was coded for grammatical form and communicative intent. The rate of mixed mode communication (MMC) was calculated. MMC rates were compared to overall TEAM scores. Statements with advisement intent (attempts to guide behavior) and edification intent (objective information) were specifically examined. The rates of MMC with advisement intent (aMMC) and edification intent (eMMC) were also compared to TEAM scores.
Results: TEAM scores did not correlate with MMC or eMMC. However, aMMC rates negatively correlated with total TEAM scores ($r = -0.556$, $p = 0.025$) and with the TEAM task management component scores ($r = -0.513$, $p = 0.042$).
Conclusions: Trauma teams with lower rates of mixed mode communication with advisement intent had better non-technical skills as measured by TEAM.

1. Introduction

About 10% of all trauma deaths are related to preventable errors, and most occur during the trauma initial assessment.[1,2] Errors of non-technical skill – including decision-making, communication, teamwork, and stress management – predominate over errors of technical skill.[2] Education to develop these non-technical skills is critical to improve trauma outcomes. One key component of non-technical skills is communication. Previous studies have identified communication in trauma teams as an area needing improvement in trauma care.[3]

National models of trauma and healthcare team education, such as the Advanced Trauma Life Support and TeamSTEPPS, primarily focus on closed-loop communication and call-outs as information exchange strategies.[4,5] However, in the real world setting, these traditionally emphasized elements of team communication may not occur frequently.[6] As such, these models do not address the nuances of communication within trauma teams and how these nuances may impact performance. Empirical and deductive analysis of trauma team communication is necessary to inform the development of effective educational targets.

It has been previously established that team performance within medical teams is significantly impacted by the sociocultural differences between its members.[7,8] Differences in roles, training, and approach to practice can create complex hierarchy and relationships that the team must successfully navigate. In speech, one method of managing these relationships is to use a communicative intent that differs from its grammatical form, or mixed mode communication.[9]

Take for example the statement "Would you get a blood pressure?" The form of the statement is a question but the intent is an attempt to guide the receiver of the message to perform an action.

* Corresponding author. 600 Highland Avenue, CSC G5/332, Madison, WI 53792, USA.
E-mail address: jung@surgery.wisc.edu (H.S. Jung).

https://doi.org/10.1016/j.amjsurg.2017.11.008
0002-9610/

Mixed mode communication plays an important role in the cultural context of a conversation by reflecting the relationships and social pressures between the speaker and the receiver.[9] Form-intent discrepancies may minimize social imposition or convey attentiveness and acquiescence.[9] However, the implicit nature of mixed mode communication can lead to misunderstanding as receivers must infer the meaning of statements that may be ambiguous with interpretations that vary depending on the culture and situation.[10]

Due to the time-sensitive and complex nature of trauma resuscitations, we hypothesized that mixed mode communication would be associated with worse trauma teamwork.

2. Materials and methods

2.1. Participants and data collection

This study was determined to be exempt by the University of Wisconsin Institutional Review Board. Informed consent for the use of data was obtained from participants. Interdisciplinary trauma simulations were conducted with eight teams, each with five trainees: a trauma chief resident (Post-graduate Year 4), surgery resident (PGY 2), emergency medicine resident (PGY 2), and two emergency medicine nurses. The simulations were performed in a simulated trauma resuscitation room, equipped with a high-fidelity manikin (Laerdal, SimMan 3G), advanced audio-visual streaming, capture and playback systems, and direct observation one-way mirrors. Each team was presented with two trauma scenarios randomly selected from a pool of eight. A total of 16 simulated trauma resuscitation scenarios were included in this study ($N = 16$). The scenarios, describe in Table 1, were designed to be cognitively challenging and representative of critically injured patients. Traumatic cardiac arrest and need for operative intervention immediately on arrival were avoided in their design.

All resident physicians were ATLS certified. In keeping with their usual roles, trauma chief residents were always the trauma team leader. One emergency medicine nurse was the circulating nurse and one was the nurse scribe. While some trauma trainees participated in more than one session, they never repeated the same scenario. Three interdisciplinary faculty facilitators (trauma surgery, emergency medicine, and emergency medicine nursing) conducted the scenarios. All simulated trauma resuscitation scenarios were audio and video recorded.

2.2. Evaluation of team performance

The videos were then assigned a code and randomized in their order of presentation before being assigned to two independent physician raters who were not involved in conducting the trauma scenarios. Both raters scored the 16 videos using the Team Evaluation Assessment Measure (TEAM) tool, a validated measure of emergency resuscitation team performance.[11] This scale divides team performance into three sub-components of “leadership, team work, and task management,” with the items in each of these categories being rated on a Likert scale from 0 “never/hardly ever” to 4 “always/nearly always.” There is also a global scale that asks the scorer to provide an overall rating between one and ten.[11] Thus, the total points possible on the TEAM tool is 54, with a possible score of eight for leadership, 28 for team work, and eight for task management. The TEAM tool was chosen over other measures of team performance, as it has been found to be a widely validated tool for assessing non-technical skill in the context of team performance.[12] The raters were given instructions on the use of the tool and had an opportunity to review and ask questions before rating the videos. There was good interrater reliability between the two raters ($ICC = 0.70$).

2.3. Coding of speech acts

The resuscitation scenarios were transcribed and the transcripts of group dialogue were divided into utterances, a chain of spoken language that represents a complete idea. These utterances were then coded using the Verbal Response Modes (VRM). VRM is a descriptive speech acts taxonomy. Speech acts theory considers each utterance as an action, with intention, purpose or effect. VRM categorizes utterances through three principles of classification, all of which are dichotomously defined as relating to the speaker or another who is the target of the speech act.[9] There are eight categories in the VRM taxonomy – disclosure, edification, advisement,

Table 1
Trauma resuscitation scenarios.

Scenario	Content
Motor vehicle collision: Hypothermia, pelvic fracture, liver laceration, hemopneumothorax	38-year-old man who presents after a motor vehicle collision. Found in a snowbank several feet away from a car struck into a light pole. Initially unresponsive, but now following commands. Complaining of chest and abdominal pain. VS: HR 55, BP 90/50, RR 23, SpO2 91%
Motor vehicle collision: Pelvic fracture, splenic laceration, right femur fracture	30-year-old woman who presents after a motor vehicle collision. Restrained driver of the vehicle, which struck the highway median. Complaining of abdominal and right lower extremity pain. VS: HR 110, BP 145/70, RR 20, SpO2 94%
Gunshot wounds: Left rib fractures with hemopneumothorax, right leg vascular injury	25-year-old man who presents after gunshot wounds to the left chest and right leg. Complaining of left chest and right leg pain. VS: HR 115, BP 90/60, RR 25, SpO2 89%
Fall: Cervical spine fracture with acute traumatic spinal cord injury, traumatic brain injury	70-year-old woman who presents after a fall down stairs. Found by EMS not moving. Awake but confused. VS: HR 50, BP 100/50, RR 26, SpO2 91%
Fall: Basilar skull fracture, cerebral edema, aortic rupture, left rib fractures, left femur fracture[a]	23-year-old man who presents after a fall from 35 feet from a scaffolding at work. Found unconscious. Responding to painful stimuli only. Left thigh deformity and left chest wall bruising. VS: HR 100, BP 95/60, RR 24, SpO2 94%
Fall/electrical injury: Left rib fractures with pneumothorax, electrical burn, cardiac dysrhythmia, rhabdomyolysis, splenic laceration[a]	42-year-old man who presents after making contact with a high-tension electrical wire and falling from the electrical pole. Complaining of shortness of breath, left chest and arm pain. VS: HR 120, BP 90/60, RR 26, SpO2 90%
Motorcycle collision: Left rib fractures, left diaphragm rupture, left kidney laceration, bilateral mandibular fractures, right depressed skull fracture[a]	35-year-old woman who presents after a motorcycle collision. Ejected after she struck a stopped car. Initially found unresponsive. Now responding to voice but in respiratory distress. VS: HR 130, BP 80/40, RR 40, SpO2 90%
Fall: Right rib fractures and pneumothorax, intracranial hemorrhage, right femur fracture[a]	21-year-old man who presents after a fall from a third floor balcony. Initially alert but became unresponsive shortly before arriving. Was complaining of right thigh pain and shortness of breath. VS: HR 110, BP 100/60, RR 24, SpO2 89%

[a] Adapted from ATLS initial assessment scenarios.[14]

Please cite this article in press as: Jung HS, et al., Why saying what you mean matters: An analysis of trauma team communication, The American Journal of Surgery (2017), https://doi.org/10.1016/j.amjsurg.2017.11.008