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Playback with a Purpose: Implementing Trauma Video Review for Leadership Coaching in Surgical Fellowship Training

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Abstract

Purpose

Leadership during trauma resuscitation is necessary to control the environment. However, leadership is not a routine part of fellowship training. Recently, trauma video review (TVR) has emerged as a powerful tool used to study trauma resuscitations. To address the gap in leadership curriculum for trauma trainees, we examined whether a coaching approach utilizing TVR would improve fellows' leadership skills. We hypothesized that coaching would improve fellow comfort and autonomy during trauma resuscitation.

Methods

Trauma fellows at a level 1 trauma center participated in quarterly TVR coaching sessions with pre-assigned trauma faculty. Preselected high-definition audiovisual trauma resuscitation data was used to facilitate each session. At the end of each session, three deliverables were created to track each fellow's longitudinal progress throughout the year. Anonymous pre- and post-course surveys were completed by both the faculty and fellows utilizing a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The survey assessed domains including comfort, autonomy, confidence, and the value of TVR. Descriptive statistics were used to summarize responses and thematic analysis of open-ended feedback was performed to identify recurring ideas.

Results

All participants (15) completed both the pre- and post-course surveys. When considering fellow comfort in leading a resuscitation, the mean comfort score did improve from 3.25 ± 0.5 to 4.33 ± 0.6 post-intervention ($p = 0.3$). Fellow satisfaction with autonomy also improved from 3.25 ± 0.5 to 4.0 ± 1.0 ($p = 0.24$). Faculty confidence scores improved significantly when considering a 1st year fellow's ability to lead a trauma in a stable patient (3.9 ± 0.7 vs. 4.78 ± 0.4, $p = 0.007$), a 1st year fellow's ability to lead a trauma in an unstable patient (2.7 ± 0.5 vs. 3.22 ± 0.4, $p = 0.03$), and a 2nd year fellow's ability to lead a trauma in an unstable patient (3.9 ± 0.6 vs. 4.45 + 0.7, $p = 0.04$). 85% of participants agreed that the most effective part of the curriculum was the coaching approach.

Conclusion

Implementation of an individualized leadership coaching curriculum using TVR led to a relative increase in fellow mean comfort and autonomy scores and also improved faculty confidence in fellow ability. TVR is a valuable coaching tool that can enhance leadership training in graduate medical education.

Introduction

Leadership is a critical non-technical skill in trauma that directly influences trauma team performance, the efficiency of care delivery, and patient outcomes.[1] Trauma resuscitations represent dynamic, high-

acuity environments that are characterized by incomplete information, rapidly changing patient physiology, multidisciplinary coordination, and significant time pressure. In this setting, the trauma team leader must control the chaos and simultaneously direct resuscitative efforts, prioritize various diagnostic and therapeutic interventions, maintain situational awareness, and facilitate effective communication and cooperation amongst team members.[2] As a result, leadership has become increasingly recognized as an essential competency in trauma care alongside clinical expertise.[1–2]

Traditionally, trauma education has emphasized technical proficiency and adherence to standardized protocols such as Advanced Trauma Life Support (ATLS). Although this curriculum provides a structured approach to a trauma resuscitation and patient management, it offers limited instruction in leadership skills, communication strategies, and team dynamics.[2–3] Prior work has demonstrated that communication difficulties and a lack of leadership contributes to errors, delays in care, and breakdowns in teamwork during trauma resuscitations.[3] Conversely, effective leadership is associated with better overall resuscitation performance.[4]

While leadership is important, it is also a fluid and individualized concept that is difficult to teach. Oftentimes, leadership skills are learned informally through observation rather than through a structured curriculum with objective assessment and feedback.[5] Trauma fellows in particular may receive limited real-time direct coaching on leadership style and communication techniques during their training. Furthermore, traditional post-event feedback relies on subjective recollection which is often inaccurate in the setting of a chaotic trauma environment. This has led to an increased interest in targeting novel educational strategies that allow for the objective review of both technical and non-technical performance during a trauma resuscitation.[6]

Increasing used by trauma centers, trauma video review (TVR) has emerged as a valuable tool for performance improvement, quality improvement, research, and resident and fellow education.[7–8] First described by Hoyt and colleagues in the 1980s, TVR allows for the objective evaluation of trauma resuscitations and captures details that are frequently absent from the medical record including communication patterns, teamwork and interactions, and leadership behaviors.[1] When considering leadership skills in particular, previous studies have demonstrated that video-based debriefing improves team function, communication, and learner confidence in trauma.[5, 9–10] Additionally, TVR has been shown to accurately assess leadership styles in the trauma bay.[11] Furthermore, multidisciplinary perceptions of TVR have become increasingly favorable, especially in regards to learner education and feedback.[12]

Despite increasing interest in formal trauma leadership education and the expanding use of TVR, there remains a gap in the literature focusing on evaluating individualized TVR-based leadership training, specifically for trauma surgery fellows. Given the importance of leadership development during the transition from trainee to independent attending surgeon, innovative educational approaches are needed to facilitate autonomy while providing structured mentorship and feedback.[6] Therefore, we sought to

evaluate whether individualized leadership coaching utilizing trauma video review could improve fellows' leadership skills and perceptions of autonomy during trauma resuscitations. We hypothesized that the implementation of an individualized coaching curriculum would improve fellow comfort and feelings of autonomy.

Methods

This was a prospective educational video review and survey-based study to evaluate the impact of structured TVR coaching sessions on trauma fellow leadership and autonomy development. The intervention was implemented over the course of a single academic year and incorporated assessment of fellow performance and perceptions among both fellows and faculty participants. Following approval from the East Carolina Institutional Review Board, four trauma and acute care surgery fellows and 11 trauma and acute care surgery faculty from a single institution participated. Fellows were paired with pre-assigned trauma faculty to facilitate continuity of feedback and longitudinal mentorship throughout the study period.

Fellows and faculty participated in quarterly structured TVR sessions with the assigned faculty mentors. Video recordings of trauma resuscitations that the fellows participated in were obtained through the institution's established TVR program and selected for review and discussion. Each session focused on reflective learning, leadership development, team communication, situational awareness, and graduated autonomy in trauma bay management. During each session, faculty provided individualized formative feedback and coaching focused on leadership behaviors and overall resuscitation management. Fellows were encouraged to self-reflect on their performance and identify areas for improvement. At the conclusion of each quarterly session, three structured deliverables were completed to facilitate longitudinal assessment and individualized fellow development throughout the academic year.

Anonymous pre- and post-intervention surveys were administered to both fellow and faculty participants. Surveys utilized a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to evaluate participant perceptions regarding comfort leading and supervising trauma resuscitations, confidence in independent decision-making, perceived autonomy, effectiveness of individualized feedback, and the educational value of TVR (Supplement 1). Participants were also given the opportunity to submit open-ended comments regarding the strengths of the curriculum, perceived limitations, and suggestions for improvement. The primary outcome studied was the change in participant perceptions regarding leadership comfort, confidence, and autonomy in trauma resuscitation management. Secondary outcomes included the perceived educational value of TVR, and quality of the feedback received.

Given the ordinal nature of Likert scale data, pre- and post-course survey responses were compared using the Wilcoxon signed-rank test for paired samples. Continuous variables are reported as means with standard deviations or medians with interquartile ranges, as appropriate. Statistical significance was defined as a p-value < 0.05. All analyses were conducted using GraphPad Prism version 9.0 (San Diego, CA). Qualitative responses from open-ended survey questions were analyzed using thematic

analysis. Responses were independently reviewed to identify recurrent concepts and themes related to leadership development, autonomy, feedback quality, and educational impact. Representative themes were then synthesized through consensus review.

Results

A total of four trauma and acute care surgery fellows and 11 faculty from the division of trauma and acute care surgery participated in the TVR coaching curriculum. Pre- and post-course confidence and satisfaction scores were compared. When considering the fellows, their comfort in viewing themselves via TVR increased at the conclusion of the course (3.25 ± 1.5 vs. 4.33 ± 0.6, p = 0.3). They also demonstrated an increase in comfort in leading a trauma resuscitation in an unstable patient (3.75 ± 0.5. 4.33 ± 0.6, p = 0.21) and leading a resuscitation with a pediatric patient (2.75 ± 9.5 vs. 3.67 ± 0.6, p = 0.07). In regard to leading a trauma in a stable patient, there was a small increase in comfort in the post-course survey (4.5 ± 0.6 vs. 4.67 ± 0.6, p = 0.72). The fellows were also asked about their satisfaction regarding their perceived autonomy while leading trauma resuscitations. Overall, they demonstrated an increase in satisfaction with their autonomy in the setting of both stable (3.75 ± 0.5 vs. 4.33 ± 0.6, p = 0.21) and unstable (3.25 ± 0.5 vs. 4.0 ± 1.0, p = 0.24) patients (Table 1).

Table 1
Fellow pre- and post-course survey results.

Question	Pre-Course Survey	Post-Course Survey	Change in Mean	p-value
Comfort in viewing yourself on TVR	3.25 ± 1.5	4.33 ± 0.6	1.08	0.3
Comfort leading trauma in stable patient	4.5 ± 0.6	4.67 ± 0.6	0.17	0.72
Comfort leading trauma in unstable patient	3.75 ± 0.5	4.33 ± 0.6	0.58	0.21
Comfort leading trauma in pediatric patient	2.75 ± 0.5	3.67 ± 0.6	0.92	0.07
Satisfaction with autonomy in stable patient	3.75 ± 0.5	4.33 ± 0.6	0.58	0.21
Satisfaction with autonomy in unstable patient	3.25 ± 0.5	4 ± 1	0.75	0.24

Faculty were asked to rate their confidence in the fellows' ability to effectively lead trauma resuscitations. In regard to the first-year fellows, faculty demonstrated a statistically significant increase in confidence in a first-year fellow's ability to lead a trauma in both a stable patient (3.9 ± 0.7 vs. 4.78 ± 0.4, p = 0.007) and an unstable patient (2.7 ± 0.5 vs. 3.22 ± 0.4, p = 0.03). Faculty also demonstrated a statistically significant increase in confidence in a second-year fellow's ability to lead a trauma in an unstable patient (3.9 ± 0.6 vs. 4.56 ± 0.7, p = 0.04). The faculty were also asked about their confidence in the fellows' ability to supervise a resident leading a trauma resuscitation. Overall, on the post-course

survey, the faculty also demonstrated a statistically significant increase in confidence in both the first-year fellows' (3.1 ± 0.7 vs. 3.67 ± 0.5, p = 0.07) and second-year fellows' (4.1 ± 0.9 vs. 4.56 ± 0.7, p = 0.24) ability to supervise a trauma resuscitation (Table 2).

Table 2
Fellow pre- and post-course survey results.

Question	Pre-Course Survey	Post-Course Survey	Change in Mean	p-value
Comfort in viewing yourself on TVR	3.5 ± 1.2	3.67 ± 1.2	0.17	0.77
Confidence in 1st year fellow's ability to lead trauma in stable patient	3.9 ± 0.7	4.78 ± 0.4	0.88	**0.007**
Confidence in 2nd year fellow's ability to lead trauma in stable patient	4.6 ± 0.5	4.89 ± 0.3	0.29	0.17
Confidence in 1st year fellow's ability to lead trauma in unstable patient	2.7 ± 0.5	3.22 ± 0.4	0.52	**0.03**
Confidence in 2nd year fellow's ability to lead trauma in unstable patient	3.9 ± 0.6	4.56 ± 0.7	0.66	**0.04**
Confidence in 1st year fellow's ability to supervise a resuscitation	3.1 ± 0.7	3.67 ± 0.5	0.57	0.07
Confidence in 2nd year fellow's ability to supervise a resuscitation	4.1 ± 0.9	4.56 ± 0.7	0.46	0.24

To gain insight into how both the faculty and fellows felt about their experience during the TVR curriculum, open ended questions including "what did you gain by completing this coaching curriculum," and "what did you think was the most effective part of this curriculum" were asked. A common theme amongst the fellows in regard to the most effective part of the curriculum was the individualized small group format. The fellows also felt that they gained better insight into how the multidisciplinary trauma team works together during a resuscitation. The majority of the faculty felt that they gained better insight into not only how to give effective feedback but also learned about their respective leadership styles and skills during trauma resuscitations. The faculty felt that one of the most effective parts of the curriculum was the ability to provide direct objective feedback to the fellows and the small group format (Table 3).

Table 3
Thematic analysis of open-ended feedback.

Group	Theme 1: Biggest gain	Theme 2: most effective part of curriculum
Fellows	Better insight into how multidisciplinary trauma team works together	Small group format with individualized feedback
	Opportunity to improve based on real situations rather than summative feedback	Creation of personalized goals based on leadership style
Faculty	Better insight into how to provide effective feedback	Ability to provide direct and objective feedback to the fellows
	Learned about personal leadership styles and skills	Longitudinal design and small group format

Discussion

In this study, we evaluated the implementation of an individualized TVR coaching designed to promote the development of leadership skills and autonomy amongst trauma and acute care surgery fellows. At the conclusion of the course, fellow participants noted improvements in self-reported comfort levels leading trauma resuscitations in both hemodynamically stable and unstable patients and also noted satisfaction with autonomy during these encounters. Faculty participants also demonstrated increased confidence regarding fellow leadership capabilities. Both the fellows and faculty also perceived significant educational value from the individualized and longitudinal nature of this curriculum. Collectively, these findings suggest that a structured TVR curriculum may represent an effective way to develop non-technical leadership skills during trauma fellowship training.

The observed improvements in both fellow comfort and autonomy are similar to those seen in prior literature evaluating video-assisted feedback in trauma education. Hamilton et al demonstrated that video-assisted debriefing after a simulated trauma resuscitation improved overall team function and perceptions of competency.[9] Similarly, Falcone et al. reported increased confidence amongst trauma team leaders following a simulation-based curriculum that incorporated both video review and structured feedback.[10] Unlike these studies, this curriculum incorporated real-life trauma resuscitations rather than simulated scenarios. The use of real-life resuscitations allowed the fellows to evaluate their own leadership behaviors within their clinical environment, potentially increasing the relevance and impact of the feedback they received.[7–8]

While the primary aim of the study was to determine whether individualized TVR-based leadership coaching would improve fellow confidence, one of the notable findings was the significant increase in faculty confidence regarding the fellows' leadership capabilities. These findings suggest that not only does the curriculum facilitate fellow development but also improves faculty awareness and recognition of the capabilities of the fellow, allowing them greater autonomy. This relationship between faculty confidence and fellow autonomy is particularly relevant within the framework of competency-based

medical education which is centered around faculty trust and how this plays a role in trainee progression towards full autonomy and independent practice.[13] Furthermore, previous work has demonstrated that by using TVR, leadership skills are taught in a more transformative or transactional style rather than the more traditional passive style. Ultimately, teams respond better to these styles of leadership which leads to improvement in patient outcomes.[11, 14–16]

The importance of individualized mentorship and personalized feedback were also important themes highlighted by both the faculty and fellows on the post-course survey. Ericsson discusses a theory of delivery practice which emphasizes repeated performance, focused feedback, and goal-oriented targeted improvement as essential mechanisms for expertise development.[17] Rather than relying on vague evaluations, this curriculum enabled both the faculty and fellows to identify fellow-specific strengths and opportunities for growth, allowing for the development of individualized leadership goals over time. Similarly, Schön discussed the importance of reflective practice in the setting of professional development and the refinement of complex skills.[18] TVR provides a unique opportunity for trainees to revisit prior trauma resuscitations, observe their behaviors, and evaluate their technical and non-technical skills. By retrospectively reflecting on these clinical experiences, TVR may accelerate leadership development and self-awareness.

Recently, increasing attention has been directed towards the development of non-technical skills in surgery including leadership, situational awareness, teamwork, and communication.[19–21] Particularly, deficiencies in these skills have been associated with both preventable errors and adverse events in high-acuity environments.[16] The results of this study suggest that leadership in trauma should be viewed as a trainable skill rather than an innate characteristic of the fellow and that TVR may serve as an effective mechanism by which these skills are developed.

This study has several limitations. First, it was conducted at a single institution, thus limiting generalizability and statistical power. Although several outcomes demonstrated a trend towards significance, the small sample size likely reduced our ability to detect statistically significant differences between pre- and post-course confidence scores. Furthermore, outcomes were based primarily on participant perceptions rather than objective measures of leadership performance. Further investigations should incorporate validated leadership assessment instruments such as the Trauma – NOn-TECHnical Skills (T-NOTECHS) tool to better quantify non-technical skill development over time.[22] Finally, the study did not evaluate the downstream effects of this curriculum on overall team performance or patient outcomes which remain important areas for future investigations.

This study contributes to the growing body of literature supporting TVR as a valuable educational tool. Our findings suggest that TVR serves as an effective tool to foster the development of individualized leadership skills and autonomy amongst surgical trainees. Future studies are needed to determine which specific leadership skills are most amenable to video-based coaching and how these competencies evolve throughout both residency and fellowship training.

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