

BRIEF REPORT

Improving Trauma Stabilization Training for Rural Family Medicine Residents

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ABSTRACT

Background and objectives: Family physicians play a crucial role in the rural emergency medicine workforce. However, family medicine residency curricula do not typically prepare them for trauma stabilization, an essential skill in emergency care.**Methods:** To bridge this gap, we developed a Trauma and Emergency Medicine Track (TEMT) in our residency program. We used a prospective case-control approach to evaluate the program's 3 year impact on (a) preparing residents to lead trauma care, (b) providing opportunities to perform trauma-specific procedures, and (c) improving residents' comfort level with trauma stabilization.**Results:** Evaluation participation was 100% for cases and 73% for comparisons. Participating residents had statistically significant increases in comfort with key trauma care skills and procedures compared to residents who did not opt into this training. Non-TEMT residents were less likely to complete Advanced Trauma Life Support and enter the emergency medicine workforce upon graduation compared to TEMT residents. Eight of nine TEMT residents (88.9%) worked emergency department shifts for at least 6 months after training, and six of nine TEMT residents (66.7%) continued to do so.**Conclusions:** This trauma training track appears to prepare family medicine residents for the emergency medicine workforce. Our study demonstrates the feasibility of implementing a trauma program that could be replicated elsewhere.

INTRODUCTION

Family physicians are critical to providing emergency care in the United States, particularly in rural locations.^{1–6} Multiple studies have demonstrated that trauma mortality risk increases in rural areas,^{6,7} driven by lack of trauma-trained staff and resources, increased transport time, and weather-related delays.^{7–11} Though trauma patients cared for in a trauma center have better outcomes, nearly 30 million rurally located Americans live more than 1 hour from a Level I or II trauma center.¹² Traumas are infrequent in rural emergency departments (EDs), many of which are staffed by family doctors² whose trauma care training may be limited to electives or observational learning. That family medicine residents graduate feeling less comfortable with trauma stabilization and key trauma care procedures is unsurprising.^{13,14}

In 2019, three Cascades East Family Medicine (CEFM) residents who aspired to work in rural EDs identified this educational gap and developed an opt-in Trauma and Emergency Medicine Track (TEMT) for postgraduate year (PGY) two and PGY-3 residents. TEMT is a partnership between Sky Lakes Medical Center's ED, trauma surgeons, and CEFM.

Here we present data gathered during the first 3 years of TEMT to evaluate its impact on (a) preparing residents to lead trauma care, (b) providing opportunities to perform trauma-specific procedures, and (c) improving residents' comfort level with trauma stabilization.

METHODS

Study Setting and Participants

Sky Lakes Medical Center is a 176-bed Level III trauma center in Klamath Falls, Oregon, serving a 10,000-square mile

geographic area. It is also a teaching hospital affiliated with the Oregon Health & Science University CEFM Residency Program.¹⁵ This 3-year program matches nine residents per year, with 80% of graduates entering rural practice following training. Klamath County has a population of approximately 70,000, 16.6% poverty rate, per-capita income of \$ 32,883, and patient-to-primary care physician ratio of 960:1.^{16,17}

Study Design and Intervention

Ours was a mixed-methods prospective case-control study of TEMT, an intervention with four components: (a) Advanced Trauma Life Support (ATLS) certification, (b) leading trauma stabilization under the supervision of emergency physicians and trauma surgeons, (c) an additional ED rotation, and (d) attending hospital Trauma Committee meetings. TEMT residents on inpatient rotations are notified by the ED when a patient meets criteria for trauma activation.

Instrumentation and Data Collection

We designed a retrospective pre-post survey tailored to the educational objectives of TEMT. Unlike independent pre-post survey designs, this design accounts for response shift bias.¹⁸ TEMT residents (cases) and non-TEMT residents (nonintervention comparisons) completed the survey at the start of PGY-2 and again before graduation. The survey assessed resident comfort performing 16 ATLS trauma stabilization skills using a 5-point Likert-type scale (1 = not at all comfortable; 2 = slightly comfortable; 3 = moderately comfortable; 4 = very comfortable; 5 = extremely comfortable). We also asked residents whether they obtained ATLS certification and whether they planned to work in an ED after graduation. TEMT residents were asked to rate the importance of each track component on a 5-point Likert-type scale and provide qualitative feedback on their experience in TEMT. All study activities were reviewed and approved by Oregon Health & Science University's Institutional Review Board (IRB #20668).

RESULTS

TEMT graduated nine residents (37.5% of residents) in its first 3 years of operation. Fifteen residents (62.5%) did not enter the track. Our survey response rate was 100% from TEMT residents and 73% from non-TEMT residents. Senior author (J.K.), formerly a TEMT resident, recused himself from the survey to avoid biasing findings.

Non-TEMT residents were less likely to complete ATLS or enter the emergency medicine workforce upon graduation compared to TEMT residents, all of whom planned to work in rural EDs posttraining (Table 1). Eight of nine TEMT residents (88.9%) worked shifts in an ED for at least 6 months after training, and six of nine TEMT residents (66.7%) continued to do so.

TEMT residents progressed from slightly comfortable to at least moderately comfortable across the spectrum of common trauma procedures (Table 2). Non-TEMT residents reported similarly low levels of comfort with trauma procedures at the first time point (Table 3) and progressed by graduation. However, at the second time point, TEMT residents demonstrated statistically significant increased comfort compared to their non-TEMT counterparts in four elements of trauma care: conducting a primary and secondary survey, placing a chest tube, placing a pelvic binder, and conducting rapid sequence intubation. Assessing the value of the various training components, TEMT residents rated ATLS certification and trauma stabilization as extremely important to their education, while the additional ED elective was split between very and extremely important (Table 1).

The most common motivations for joining the track were a desire to work in rural EDs after graduation and to gain advanced skills training (Appendix A). TEMT residents most appreciated that the track provided exposure to emergency medicine teams and systems, extra volume, and repetition of trauma stabilizations.

TABLE 1. Residents' Rating of TEMT Training Components and ATLS Training and Intention to Provide Care in Emergency Departments Among TEMT and Non-TEMT Residents

TEMT training components	Average rating among TEMT residents ^a		
ATLS certification	4.8		
Additional emergency department rotation	4.4		
Trauma team participation	4.9		
Additional trauma-focused didactics	3.8		
Trauma committee participation	3.1		
Trauma care variables	TEMT residents (n = 8) n (%)	Non-TEMT residents (n = 11) n (%)	P value
Received ATLS training during residency	8 (100)	2 (18.2)	<0.001 ^b
Plan on providing care in emergency department posttraining	8 (100)	3 (27.3)	0.002 ^b

^aScale: 1=Not at all important; 2=Somewhat important; 3=Moderately important; 4=Very important; 5=Extremely important

^bFisher exact test

Abbreviations: ATLS, Advanced Trauma Life Support; TEMT, Trauma and Emergency Medicine Track

TABLE 2. Paired Analysis of Comfort With Trauma Training Procedures and Intention to Provide Care in Emergency Departments Posttraining Among TEMT Residents (*N* = 8)

Comfort with trauma training procedures	Pretraining Mean (SD) Range	Posttraining Mean (SD) Range	<i>P</i> value ^a Effect size ^b
Conducting a primary and secondary survey	2.38 (1.06) 1–4	3.63 (0.52) 3–4	.028 ^a 1.28 ^b
Placing a chest tube	2.13 (0.84) 1–3	3.75 (0.71) 3–5	.003 ^a 1.06 ^b
Placing a pelvic binder	2.43 (0.79) 2–4	3.29 (1.25) 2–5	.078 ^a 1.07 ^b
Running conscious sedation	1.63 (0.74) 1–3	2.75 (0.71) 2–4	.026 ^a 1.13 ^b
Conducting rapid sequence intubation	2.38 (1.19) 1–5	3.88 (0.84) 3–5	.003 ^a 0.93 ^b
Managing hemorrhagic shock, including initiating a massive transfusion protocol	2.50 (0.76) 1–3	3.63 (0.52) 3–4	.007 ^a 0.84 ^b
Reducing complex fractures	1.50 (0.54) 1–2	3.00 (0.93) 1–4	.003 ^a 0.93 ^b
Splinting complex fractures	1.88 (0.35) 1–2	3.13 (0.99) 2–5	.028 ^a 1.28 ^b
Administering medications required for rapid sequence intubation	2.13 (0.99) 1–4	3.63 (1.30) 2–5	.014 ^a 1.31 ^b
Running a code	2.25 (1.28) 1–5	3.50 (1.07) 2–5	.038 ^a 1.39 ^b
Running a pediatric trauma	1.38 (1.06) 1–4	2.50 (1.31) 1–5	.007 ^a 0.84 ^b
Running an obstetrics trauma	1.75 (0.71) 1–3	2.50 (0.54) 2–3	.048 ^a 0.89 ^b
Transferring a trauma patient	2.13 (0.84) 1–3	3.25 (1.49) 1–5	.065 ^a 1.46 ^b
Performing a cricothyrotomy	1.38 (0.74) 1–3	2.00 (0.76) 1–3	.011 ^a 0.52 ^b
Recognizing and treating cardiac tamponade	1.75 (0.71) 1–3	2.38 (0.74) 1–3	.049 ^a 0.74 ^b
Performing a POCUS FAST exam	2.63 (0.74) 2–4	4.00 (1.07) 2–5	.014 ^a 1.19 ^b

Scale: 1=Not at all comfortable; 2=Slightly comfortable; 3=Moderately comfortable; 4=Very comfortable; 5=Extremely comfortable

^aPaired samples *t* test

^bCohen's *d* (Interpretation: >0.50 is a meaningful effect size)

Abbreviations: FAST, Focused Assessment with Sonography in Trauma; POCUS, point-of-care ultrasound; SD, standard deviation; TEMT, Trauma and Emergency Medicine Track

DISCUSSION

We learned that it is feasible to develop and implement a trauma training track in a rural community teaching hospital that builds comfort among family medicine residents in trauma procedures and stabilization, preparing them to work in rural EDs. In 3 years, more than 35% of our residents completed the 2 year opt-in program. Participating residents had significantly increased comfort across ATLS trauma stabilization procedures. They also graduated more comfortable than non-TEMT residents in all measured components and significantly more comfortable in essential trauma care skills—performing primary/secondary surveys, managing rapid sequence intubations, and placing chest tubes. These findings are notable because all CEFM trainees receive robust training in critical care and emergency medicine, as demonstrated by non-TEMT residents reporting increased comfort with

trauma procedures through our standard training. Nevertheless, in every ATLS skill, TEMT residents were more comfortable at the second time point compared to their non-TEMT counterparts. The relationship between comfort and competence is complex, where a mismatch can hinder a learner's ability to perform tasks correctly and safely, highlighting the need for a balanced assessment approach.¹⁹ While self-assessment of comfort does not directly translate to competence, we believe that the observed increase in comfort reflects increased clinical exposure and may increase the likelihood of graduates entering the emergency workforce. Thus, the best indicator of program success was participation of all TEMT graduates in the emergency medicine workforce after graduation, which contrasts with their non-TEMT counterparts and is substantially higher than the average

TABLE 3. Paired Analysis of Comfort With Trauma Care Procedures Between TEMT and Non-TEMT Residents Pre- and Posttraining

Trauma care variables	Baseline assessment			Time two assessment		
	TEMT residents (n = 8) Mean (SD) Range	Non-TEMT residents (n = 11) Mean (SD) Range	P value ^a	TEMT residents (n = 8) Mean (SD) Range	Non-TEMT residents (n = 11) Mean (SD) Range	P value ^a
Conducting a primary and secondary survey	2.38 (1.06) 1-4	2.46 (0.69) 1-3	0.845	3.63 (0.52) 3-4	3.00 (0.63) 2-4	0.030
Placing a chest tube	2.13 (0.84) 1-3	1.82 (0.87) 1-3	0.452	3.75 (0.71) 3-5	2.82 (0.98) 1-4	0.028
Placing a pelvic binder	2.43 (0.79) 2-4	1.64 (0.92) 1-4	0.080	3.29 (1.25) 2-5	2.00 (1.10) 1-4	0.020
Running conscious sedation	1.63 (0.74) 1-3	1.73 (0.65) 1-3	0.753	2.75 (0.71) 2-4	2.36 (0.67) 1-3	0.249
Conducting rapid sequence intubation	2.38 (1.19) 1-5	2.27 (0.79) 1-3	0.721	3.88 (0.84) 3-5	3.18 (0.87) 2-4	0.386
Managing hemorrhagic shock, including initiating a massive transfusion protocol	2.50 (0.76) 1-3	2.36 (0.67) 1-3	0.979	3.63 (0.52) 3-4	3.09 (0.70) 2-4	0.049
Reducing complex fractures	1.50 (0.54) 1-2	2.45 (0.69) 1-3	0.893	3.00 (0.93) 1-4	3.27 (0.65) 1-4	0.205
Splinting complex fractures	1.88 (0.35) 1-2	1.64 (0.67) 1-3	0.642	3.13 (0.99) 2-5	2.27 (1.01) 1-5	0.123
Administering medications required for rapid sequence intubation	2.13 (0.99) 1-4	2.00 (0.78) 1-4	0.678	3.63 (1.30) 2-5	2.63 (1.29) 2-4	0.363
Running a code	2.25 (1.28) 1-5	2.09 (0.83) 1-3	0.746	3.50 (1.07) 2-5	3.00 (0.63) 2-4	0.264
Running a pediatric trauma	1.38 (1.06) 1-4	1.27 (0.47) 1-2	0.778	2.50 (1.31) 1-5	1.64 (0.92) 1-3	0.136
Running an obstetrics trauma	1.75 (0.71) 1-3	1.91 (0.83) 1-3	0.667	2.50 (0.54) 2-3	2.46 (1.21) 1-4	0.914
Transferring a trauma patient	2.13 (0.84) 1-3	2.18 (0.87) 1-3	0.888	3.25 (1.49) 1-5	2.64 (1.21) 1-5	0.355
Performing a cricothyrotomy	1.38 (0.74) 1-3	1.09 (0.30) 1-2	0.265	2.00 (0.76) 1-3	1.46 (0.93) 1-4	0.178
Recognizing and treating cardiac tamponade	1.75 (0.71) 1-3	1.64 (0.67) 1-3	0.727	2.38 (0.74) 1-3	2.18 (0.98) 1-4	0.632
Performing a POCUS FAST exam	2.63 (0.74) 2-4	2.64 (1.03) 1-5	0.979	4.00 (1.07) 2-5	3.46 (1.04) 2-5	0.283

Scale: 1=Not at all comfortable; 2=Slightly comfortable; 3=Moderately comfortable; 4=Very comfortable; 5=Extremely comfortable

^aIndependent samples t test^bCohen's d (interpretation: >0.50 is a meaningful effect size)

participation rate in the American Board of Family Medicine postgraduate survey.²⁰

We believe that this program offers a reproducible model for implementation in other residencies, especially rural programs, to improve resident comfort with trauma stabilization, thereby increasing the likelihood that family medicine trainees will staff EDs after training. Educational tracks like TEMT are now more feasible with the Accreditation Council for Graduate Medical Education's increase in elective hours. As our program matures, we will increase TEMT residents' exposure to rare events (ie, cricothyrotomies, obstetric and pediatric stabilizations) through simulations and build a better resident notification system for trauma

activations. We continue to offer this as an opt-in track to focus resources on residents who plan to work in EDs.

Study limitations included a small sample size and limited generalizability as a single-site study. Additionally, self-selection bias may have affected our results. Residents interested in emergency medicine may have sought more opportunities for trauma stabilization training even without the training track. However, our results suggest that those with increased interest had not gained more skills or confidence in trauma care compared to the comparison group before starting the track. Another limitation is the absence of procedure performance data and trauma attendance numbers

from the first three program years due to tracking system inaccuracies, resulting in nonreportable data.

CONCLUSIONS

Trauma education is lacking in most family medicine training programs. Participants in our trauma training track feel better prepared for trauma stabilizations, have increased comfort with trauma-related procedures, and tend to work in EDs posttraining. We believe that increased comfort in these critical skills will encourage more graduating residents to pursue careers in the emergency medicine workforce, an urgent need in rural communities.

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