The American Journal of Surgery 220 (2020) 1456–1461

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

The role of palliative care in acute trauma: When is it appropriate?

Brendon M. Esquibel [a], Christine J. Waller [b, *], Andrew J. Borgert [c], Kara J. Kallies [c], Thomas D. Harter [d], Thomas H. Cogbill [b]

[a] General Surgery Residency, Department of Medical Education, Gundersen Health System, La Crosse, WI, USA
[b] Department of General Surgery, Gundersen Health System, La Crosse, WI, USA
[c] Department of Medical Research, Gundersen Health System, La Crosse, WI, USA
[d] Department of Bioethics and Humanities, Gundersen Health System, La Crosse, WI, USA

ARTICLE INFO

Article history:
Received 27 March 2020
Received in revised form
21 August 2020
Accepted 4 October 2020

Keywords:
Palliative care
Advance directive
Trauma resuscitation
Trauma outcomes
Medical decision-making

ABSTRACT

Introduction: We hypothesized that trauma providers are reticent to consider palliative measures in acute trauma care.
Methods: An electronic survey based on four patient scenarios with identical vital signs and serious blunt injuries, but differing ages and frailty scores was sent to WTA and EAST members.
Results: 509 (24%) providers completed the survey. Providers supported early transition to comfort care in 85% old-frail, 53% old-fit, 77% young-frail, and 30% young-fit patients. Providers were more likely to transition frail vs. fit patients with (OR = 4.8 [3.8–6.3], $p < 0.001$) or without (OR = 16.7 [12.5–25.0], $p < 0.001$) an advanced directive (AD) and more likely to transition old vs. young patients with (OR = 2.0 [1.6–2.6], $p < 0.001$) or without (OR = 4.2 [2.8–5.0], $p < 0.001$) an AD.
Conclusions: In specific clinical situations, there was wide acceptance among trauma providers for the early institution of palliative measures. Provider decision-making was primarily based on patient frailty and age. ADs were helpful for fit or young patients. Provider demographics did not impact decision-making.

Introduction

The underlying ethos of acute trauma management errs on the side of aggressive, life-saving care. Trauma patients often arrive in extremis, mandating rapid decision-making and immediate, invasive treatment measures. These situations may offer little opportunity for discussion, clarification, or questions regarding goals of care. Further complicating matters, trauma patients are frequently unconscious, de-identified, and unaccompanied by an advance directive (AD) or next of kin decision-maker.[1]

Conversely, the principles of palliative and end-of-life care include symptom control and management of the psychological, social, and spiritual issues that may arise in patients with conditions that are chronic, fatal, or unresponsive to curative treatment. Several groups have described the process of transitioning established trauma patients to comfort or palliative care approaches in the intensive care unit (ICU) setting.[2–4] This approach can be challenging to integrate into contemporary acute trauma treatment algorithms, most of which are built to provide rapid, curative care to unstable patients, with less regard for intrusiveness and resource consumption. For these reasons, the role of palliative care early in acute trauma management remains poorly defined and is often only considered after all other options have failed.[5] There is a paucity of literature concerning the willingness of trauma providers to consider this process in more acute settings, such as the emergency department (ED).

The objective of this study was to investigate the clinical circumstances and trauma provider characteristics associated with a willingness to consider palliative care measures in the early management of acute trauma. We hypothesized that most trauma providers are reticent to consider palliative measures early in acute trauma care, and that both patient and provider characteristics drive decisions about early transitions to comfort care.

Materials and methods

An IRB-approved electronic survey (QuestionPro Inc., San Francisco, CA, USA) was distributed to all current members of the

* Corresponding author. Gundersen Health System, 1900 South Avenue C05-001, La Crosse, WI 54601, USA.
E-mail address: cjwaller@gundersenhealth.org (C.J. Waller).

https://doi.org/10.1016/j.amjsurg.2020.10.002
0002-9610/

Western Trauma Association (WTA) and the Eastern Association for the Surgery of Trauma (EAST) in October 2018 with permission of each association's multicenter research chairperson or committee. The combined membership of these two societies was estimated to be 2125 members. The survey was voluntary and anonymous. Respondents were given the option to separately include their contact information to be used in a random drawing as an incentive for completing the survey ($250.00 gift card).

The survey consisted of two parts. The first posed several questions regarding respondent background and demographics. The second part provided four patient scenarios with corresponding questions (Fig. 1). Each patient scenario involved a trauma patient who had sustained serious blunt traumatic injuries with an Injury Severity Score = 29. Each of the four patient scenarios had the same mechanism, identical vital signs, and matching injuries, but differed in patient age and frailty scores. Respondents were asked which patients they would be willing to transition to a comfort care approach, and if so, under what circumstances and at what point during the acute trauma management timeline. We chose to narrowly define palliative measures in the acute trauma setting as a full transition in management to an end-of-life or comfort-care only approach, including the withholding and/or withdrawal of aggressive treatment modalities.

Statistical analysis included descriptive statistics as well as chi-square tests to compare responses based on multiple factors, including gender and duration of practice. Multivariate polytomous logistic regression analysis was performed to further assess the impact of an AD on providers' decision-making. Level of confidence was defined as p-value <0.05. All statistical calculations were performed using the SAS software suite, version 9.4 (SAS Foundation; Cary, NC, USA).

Case Scenario

Please read the scenario below and then answer the questions that follow for each of four patient situations based on additional details provided:

You are the treating physician for a patient who arrived in the ED by ambulance after a motor vehicle collision at highway speeds. The patient's spouse was the driver and died at the scene.

Patient is in the trauma bay, awake but confused, in pain, and non-interactive with staff.

Initial vital signs are HR 102, BP 90/52, RR 28, and SpO2 84% on 15L non-rebreather mask.

Work-up shows multiple injuries, including massive maxillofacial trauma, flail chest, bilateral pulmonary contusions, and a displaced left femur fracture, with concern for impending airway compromise. ISS in the ED is 29.

You are confident that the injuries are survivable in the short-term with aggressive resuscitation and interventions but assess long-term prognosis to be uncertain.

Variable	Patient #1	Patient #2	Patient #3	Patient #4
Age, years	80	80	52	52
Living situation	Nursing home	Independent, at own home	Home with home health aides	Independent, at own home
Medical history	COPD, CHF secondary to ischemic heart disease with an EF of 20%, moderate Alzheimer's dementia, and recurrent episodes of anxiety and depression.	Hypertension, no other significant comorbidities.	Type 2 diabetes, COPD on home O2, hypertension, and peripheral vascular disease.	Hypertension, no other significant comorbidities.
Modified frailty score	>0.36 = Severe Frailty	0.12 = Fit	>0.36 = Severe Frailty	0.12 = Fit

Fig. 1. Case scenario and four patient descriptions presented to survey respondents.

Table 1
Respondent demographics.

Variable	N (%)
Gender	
Female	151 (29.7)
Male	355 (69.7)
Prefer not to answer	3 (0.6)
Role	
Trauma surgeon	441 (86.6)
Surgeon, other	23 (4.5)
Resident/Fellow	21 (4.1)
Nurse practitioner	11 (2.2)
Physician (nonsurgical)	10 (2.0)
Physician Assistant	3 (0.6)
Completed a fellowship[a]	431 (86.6)
Acute care surgery/Trauma surgery/Critical care	408 (80.2)
Vascular surgery	9 (1.8)
Minimally invasive surgery	1 (0.2)
Transplant surgery	1 (0.2)
Hepatobiliary surgery	1 (0.2)
Completed residency in the U.S.	498 (97.8)
Current practice in U.S.	502 (98.6)
U.S. Region of practice[b]	
South	197 (39.2)
Midwest	112 (22.3)
Northeast	105 (20.9)
West	88 (17.5)

[a] Eleven respondents did not indicate whether they did or did not complete a fellowship; of the 431 respondents who indicated that they completed a fellowship, 420 noted the type of fellowship completed.
[b] Excludes 7 respondents who indicated that their current practice is outside of the U.S.

Results

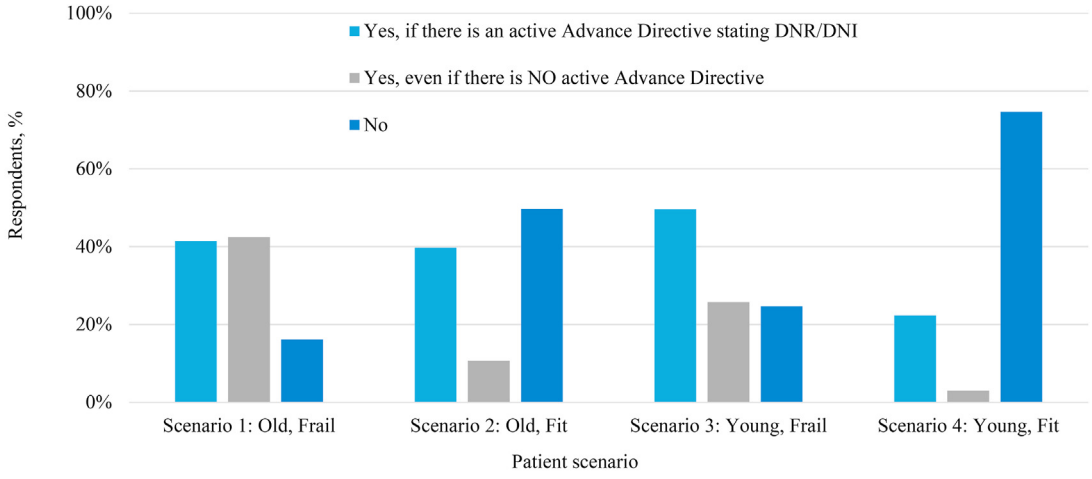
Five hundred nine providers completed the survey for a response rate of 24%. The majority of respondents were trauma surgeons who had completed their residency training in the United States and were currently practicing in the U.S. (Table 1). Of the seven respondents who indicated that their current practice was outside of the U.S., five (1%) practiced in Canada, one in South America (0.2%), and one in the Caribbean (0.2%). The mean number of years in practice was 13.3 ± 10.5. Overall, 473 (93%) respondents indicated that their medical center had a palliative care service available for consult, while 31 (6%) did not, and 5 (1%) were unsure. When asked about institutional influences in their current practice that may impact their willingness to transition patients to a comfort care, 222 (51%) noted that there were no institutional influences that would impact this decision making, 186 (43%) indicted that their practice was very accepting of advance care planning, and 26 (6%) indicated that their practice was not very accepting of advance care planning.

Trauma providers were willing to transition to a comfort care approach in the ED for 85% of old-frail (patient scenario #1), 53% of old-fit (patient scenario #2), 77% of young-frail (patient scenario #3), and 30% of young-fit patients (patient scenario #4). The "willing to transition" groups were further delineated based on the presence or absence of an AD stating "do not resuscitate" or "do not intubate" (Fig. 2).

Patient frailty and age were the strongest predictors of provider willingness to transition to comfort care in the ED. When comparing providers' willingness to transition to comfort care for frail versus fit patients, 45.3% vs. 31.2% would transition with an AD, 34.5% vs. 7.0% would transition without an AD, and 20.2% vs. 61.8% would not transition to comfort care in the ED, respectively ($p < 0.001$). Similarly, 40.6% vs. 36.1% would transition with an AD, 27.0% vs. 14.5% would transition without an AD, and 32.4% vs. 49.4% would not transition to comfort care in the ED for older versus younger patients, respectively ($p < 0.001$). The impact of an AD was further assessed in a multivariate model, where patient frailty had the strongest influence on providers' decisions, with providers more likely to transition frail vs. fit patients to comfort care, either with (OR 4.8, 95%CI: 3.8–6.3; $p < 0.001$) or without (OR 16.7, 95%CI: 12.5–25.0; $p < 0.001$) an AD. Providers were also more likely to transition old vs. young patients to comfort care, either with (OR 2.0, 95%CI: 1.6–2.6; $p < 0.001$) or without (OR 4.2, 95%CI: 2.8–5.0; $p < 0.001$) an AD.

For respondents who stated they would not be willing to transition to comfort care in the ED, increasing numbers indicated agreement with comfort care in the ICU or after additional therapeutic measures (Fig. 3). Every respondent elected transition to comfort care at some juncture in the old-frail patient, and all but one respondent would transition the young-frail patient to comfort care. Forty-two (10%) respondents stated that they would not be willing to transition a young-fit patient to comfort care, compared to 2% for an old-fit patient.

Providers noted that short-term prognoses had some or significant influence on the decision to transition to comfort care, for 74%



DNR = do not resuscitate; DNI = do not intubate.

Fig. 2. Proportion of respondents who would transition to a comfort care approach after evaluation in the emergency department based on patient scenario.

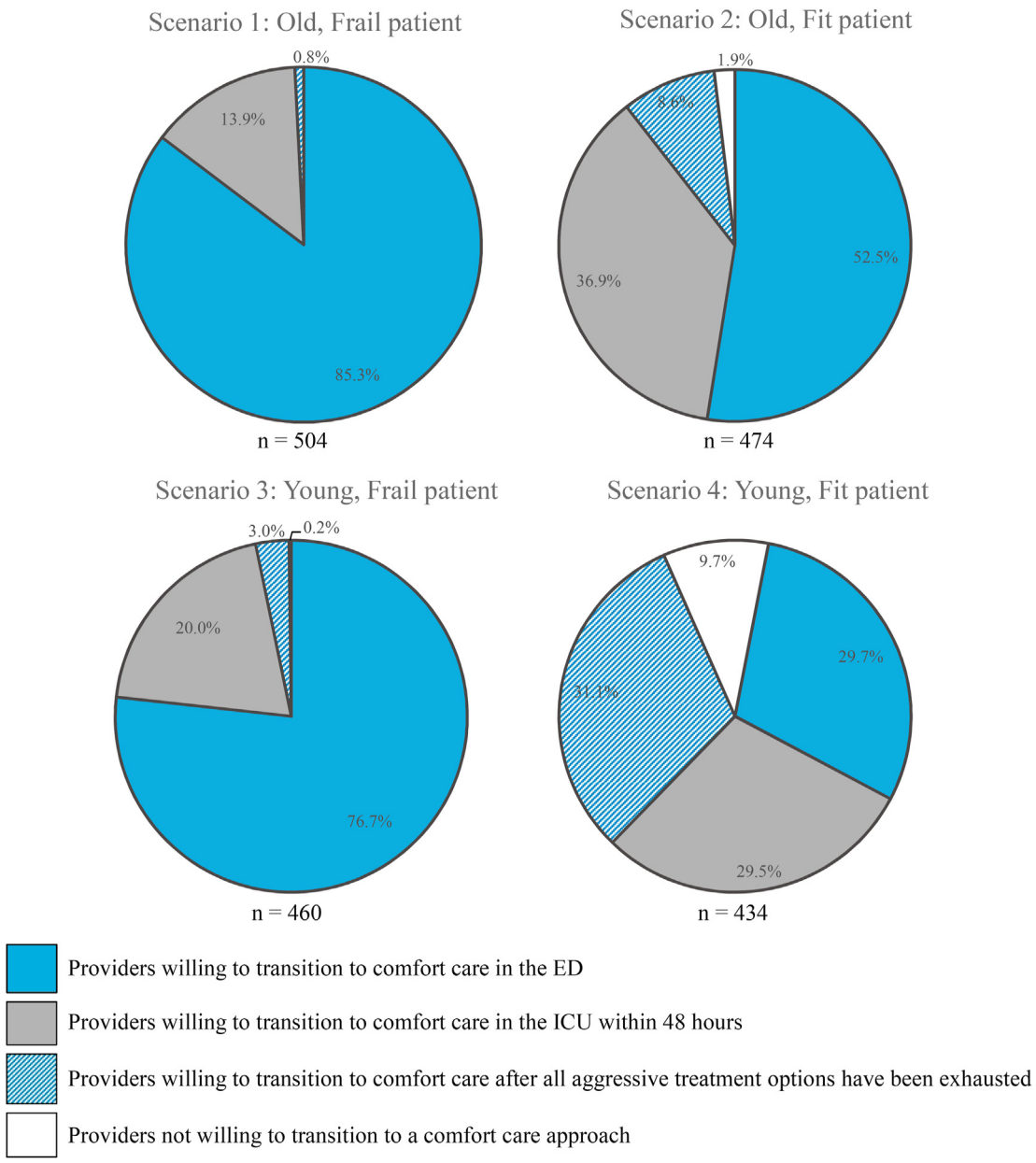


Fig. 3. Timing of provider willingness to transition to a comfort care approach for four patient scenarios.

old-frail, 71% old-fit, 73% young-frail, and 67% young-fit patients. Long-term prognosis was also noted to have some or significant influence in the decision to transition for 91% old-frail, 88% old-fit, 88% young-frail, and 84% young-fit patients. Conversations with family or loved ones about patient preferences was noted to have some or significant influence on the decision to transition to comfort care for 99% old-frail, 98% old-fit, 99% young-frail, and 94% young-fit patients.

No significant differences in respondents' willingness to transition to a palliative care approach were observed based on respondents' gender (Table 2), practice duration (Table 3), or geographic location of practice.

Discussion

Ten to 15% of all trauma patients will die from their injuries or resultant complications despite aggressive treatment measures.[6] The mortality rate is even higher for geriatric trauma patients.[7] The number of Americans ages 65 and older is projected to nearly double from 52 million in 2018 to 95 million by 2060; this age group's share of the total population will rise from 16% to 23%.[8] Geriatric patients currently account for 30% of all trauma admissions in the United States.[9] As the population ages, it is predicted that by 2050, approximately 40% of trauma patients will be over the age of 65.[10] These statistics emphasize that end-of-life care for trauma patients has increasing importance.

The timing and clinical situations in which palliative measures and end-of-life care transitions are made in trauma settings remain poorly defined. Most applicable studies have focused on palliative care involvement and end-of-life transitions for trauma patients in the ICU.[1–5,7,11] Fiorentino and co-authors stressed that palliative care for trauma patients in the ICU was useful for end-of-life or discharge planning of patients with poor outcomes.[11] Several groups have emphasized the need for improved integration of

Table 2
Respondents' willingness to transition to a comfort care or palliative care approach in the emergency department by reported gender.

Scenario	N	Yes, if there is an active Advance Directive stating DNR/DNI		Yes, even if there is NO active Advance Directive		No		*P* value
		Female	Male	Female	Male	Female	Male	
		n (%)						
Scenario 1: Old, Frail	506	65 (43)	143 (40)	65 (43)	151 (43)	21 (14)	61 (17)	0.64
Scenario 2: Old, Fit	477	64 (44)	125 (38)	12 (8)	39 (12)	69 (48)	168 (51)	0.32
Scenario 3: Young, Frail	460	78 (55)	149 (47)	31 (22)	88 (28)	32 (23)	82 (26)	0.21
Scenario 4: Young, Fit	451	29 (21)	71 (22)	1 (1)	13 (4)	105 (78)	232 (73)	0.14

DNR = do not resuscitate; DNI = do not intubate.

Table 3
Respondents' willingness to transition to a comfort care or palliative care approach in the emergency department by reported duration in practice.

Scenario	N	Yes, if there is an active Advance Directive stating DNR/DNI	Yes, even if there is NO active Advance Directive	No	*P* value
		Years; Mean ± SD			
Scenario 1: Old, Frail	509	12.9 ± 11.0	13.6 ± 10.1	13.4 ± 10.6	0.57
Scenario 2: Old, Fit	479	11.9 ± 9.2	12.4 ± 10.2	14.6 ± 11.3	0.1
Scenario 3: Young, Frail	462	13.1 ± 10.8	13.4 ± 9.6	13.3 ± 11.0	0.71
Scenario 4: Young, Fit	453	11.6 ± 9.5	12.1 ± 9.5	13.8 ± 10.7	0.25

DNR = do not resuscitate; DNI = do not intubate.

palliative and trauma services in the critical care setting, and the importance of trauma systems to evolve as providers are asked to participate in these transitions.[2–5,12] We are aware of no previous studies focused on forgoing invasive trauma management in the ED in favor of comfort care alone.

In specific clinical situations, our survey of 509 trauma providers found wide acceptance for the early institution of palliative measures in acute trauma settings. Patient frailty was the strongest predictor of provider willingness to transition to comfort care, followed by patient age. Transition to palliative measures in the ED for the old-frail and younger-frail patients were elected by 85% and 77% of trauma providers, respectively. In contrast, this transition was selected by 53% of respondents for old-fit and 30% for younger-fit patients. Every provider surveyed eventually supported palliative measures for the old-frail patient. This contrasts with 10% never willing to transition to comfort care for the younger, fit patient.

A similar proportion of providers indicated that short-term prognosis, long-term prognosis, and conversations with the patient's family were somewhat or significantly influential on the decision to transition to a comfort care approach across all four patient scenarios. Among these factors, the influence on decision-making by discussions with the family was mentioned by nearly every provider.

Although we documented the importance of patient frailty and age in making the decision to initiate palliative care, others have observed that ISS and patient comorbid conditions alone cannot be used to accurately predict futility in the care of geriatric trauma patients.[13] This has led to the development of metrics that can be used to predict trauma outcomes. The Geriatric Trauma Score (GTOS) is based upon age, ISS, and transfusions in first 24 h.[14] The GTOS and the Trauma Injury Severity Score (TRISS) which is based on age, ISS, and Revised Trauma Score are equally accurate in predicting mortality in geriatric trauma patients.[15] The Elderly Mortality After Trauma (EMAT) Score which considers age, comorbidity, physiologic parameters, and injury types has recently been introduced.[16] The EMAT Score has an adaptation designed for assessing outcome in the ED. These scoring systems, when applied in the ED, may assist providers in determining which patients are most appropriate for transitioning to palliative measures.

Trauma patients are often admitted to a distant regional trauma center in which they have never been treated before. There may be no familiar providers and no established medical records available for review. Family members are often not present or are also injured and therefore unavailable for advice regarding difficult care decisions. In these situations, an active AD allows patient wishes to be known, making respectful treatment decisions easier when the patient and family are unable to participate. Survey respondents in our study found an AD most helpful in making the transition to palliative care in younger, more fit patients. However, young, healthy trauma victims are the least likely to have completed an AD. Additionally, patients rarely have a copy of their AD with them when taken urgently to a trauma center. Even among trauma patients over 55 years of age in a previous study at our institution, only 18% had an AD available at the time of emergency room admission.[1] Increased efforts at AD education and development of a standardized method of AD entry into the electronic medical record in which all healthcare systems have access are necessary.

We found no differences in decision-making based on the provider-dependent variables that we investigated. These included provider gender, mean number of years in practice, and geographic location of practice. Nearly all of the respondents to our survey were from the U.S. When considering other countries and cultures, others have stressed that geographic differences in religion, practice types, provider views, political differences and institutional resources resulted in significant variation in end-of-life care after injury.[17] Clearly, decisions involving the transition from active trauma resuscitation to palliative care are difficult and involve many factors that were outside of the focus of this study.

Our study further highlights the need for expanding palliative care education beginning with increased provider awareness and acceptance of this approach as a viable option for select trauma patients, followed by development of health system and department-based care practices. While most trauma providers deliver some components of palliative care, improved integration of a palliative care specialist with the trauma care team may facilitate goals of care discussions and the decision-making process. Interdisciplinary collaboration from trauma and palliative care specialists has been detailed in the American College of Surgeons Trauma Quality Improvement Program guidelines and early

involvement of palliative care has been demonstrated to be feasible, with improved secondary outcomes.[18–20]

This study had several limitations. Survey responses were gathered from members of two professional trauma surgery societies and may not be representative of all trauma providers. Nearly all of the respondents were from the U.S. and may not represent the opinions of providers from other parts of the world. Survey completion was voluntary with potential for bias depending on respondents' interest in the survey topic. Although we were satisfied with a 24% response rate in this large sample survey, the views of respondents may not be representative of the entire groups queried. Surveys often dictate a binary response when decisions are often multifactorial and situationally nuanced. Finally, this study did not investigate respondents' actual clinical experience in making decisions to transition acute trauma patients to palliative care.

Provider attitudes concerning the early selection of comfort care measures for trauma patients deserves further analysis. Future research might elucidate the differences between what providers indicate they would do in hypothetical trauma scenarios versus the actual clinical decisions made in acute trauma settings. This might best be accomplished in a prospective, multicenter study of documented provider experiences with end-of-life decision making in acute trauma care. The study would focus on the timing and degree of comfort care measures and identify which factors were most important in making those decisions, including the role of advanced directives. Finally, outcomes of these transitions in care in terms of resource allocation and patient/family satisfaction could be objectively measured.

Conclusions

The role of palliative care in acute trauma settings is evolving. In specific clinical situations, we documented wide acceptance among trauma providers for the early institution of palliative measures. Provider decision-making was primarily driven by patient frailty and advanced age. The presence of an AD was most helpful for decision-making in fit or younger patients. Provider demographics did not have a significant influence on the willingness to transition to palliative care early in the acute trauma setting.

Funding statement

This research did not receive any specific grant from external funding agencies in the public or commercial sectors. Financial support for the survey was provided by the Gundersen Medical Foundation.

References

1. Hill LA, Waller CJ, Borgert AJ, Kallies KJ, Cogbill TH. Impact of advanced directives on outcomes and charges in elderly trauma patients. *J Palliat Med*. 2020;23:944–949.
2. Karlekar M, Collier B, Parish A, et al. Utilization and determinants of palliative care in the trauma intensive care unit: results of a national survey. *Palliat Med*. 2014;28:1062–1068.
3. Mosenthal AC, Weissman DE, Curtis JR, et al. Integrating palliative care in the surgical and trauma intensive care unit: a report from the improving palliative care in the intensive care unit (IPAL-ICU) project advisory board and the center to advance palliative care. *Crit Care Med*. 2012;40:1199–1206.
4. O'Connell K, Maier R. Palliative care in the trauma ICU. *Curr Opin Crit Care*. 2016;22:584–590.
5. Mosenthal AC, Murphy PA. Trauma care and palliative care: time to integrate the two? *J Am Coll Surg*. 2003;197:509–516.
6. Norton R, Kobusingye O. Injuries. *N Engl J Med*. 2013;368:1723–1730.
7. Hashmi A, Ibrahim-Zada I, Rhee P, et al. Predictors of mortality in geriatric trauma patients: a systematic review and meta-analysis. *J Trauma Acute Care Surg*. 2014;76:894–901.
8. Mather M, Scommegna P, Kilduff L. *Fact Sheet: Aging in the United States*; 2020. https://www.prb.org/aging-unitedstates-fact-sheet/. Accessed March 27.
9. Kozar RA, Arbabi S, Stein DM, et al. Injury in the aged: geriatric trauma care at the crossroads. *J Trauma Acute Care Surg*. 2015;78:1197–1209.
10. Cutugno CL. The 'graying' of trauma care: addressing traumatic injury in older adults. *Am J Nurs*. 2011;111:40–48.
11. Fiorentino M, Hwang F, Pentakota SR, et al. Palliative Care in trauma: not just for the dying. *J Trauma Acute Care Surg*. 2019;87:1156–1163.
12. Cocanour CS. End-of-life care in trauma. *J Trauma Acute Care Surg*. 2015;79:891–896.
13. Duvall DB, Zhu X, Elliott AC, et al. Injury severity and comorbidities alone do not predict futility of care after geriatric trauma. *J Palliat Med*. 2015;18:246–250.
14. Zhao FZ, Wolf SE, Nakonezy PA, et al. Estimating geriatric mortality after injury using age, injury severity, and performance of a transfusion: the geriatric trauma outcome score. *J Palliat Med*. 2015;18:677–681.
15. Madni TD, Ekeh AP, Brakenridge SC, et al. A comparison of prognosis calculators for geriatric trauma: a Prognostic Assessment of Life and Limitations after Trauma in the Elderly consortium study. *J Trauma Acute Care Surg*. 2017;83:90–96.
16. Morris RS, Milia D, Glover J, et al. Predictors of elderly mortality after trauma: a novel outcome score. *J Trauma Acute Care Surg*. 2020;88:416–424.
17. Ball CG, Navsaria P, Kirkpatrick AW, et al. The impact of country and culture on end-of-life care for injured patients: results from an international survey. *J Trauma*. 2010;69:1323–1333.
18. American College of Surgeons Trauma Quality Improvement Program. *ACS TQIP Best Practice Guidelines*; 2020. Available at: https://www.facs.org/-/media/files/quality-programs/trauma/tqip/palliative_guidelines.ashx. Accessed August 14.
19. Aziz HA, Lunde J, Barraco R, et al. Evidence-based review of trauma center care and routine palliative care processes for geriatric trauma patients; A collaboration from the American association for the surgery of trauma patient Assessment committee, the American association for the surgery of trauma geriatric trauma committee, and the eastern association for the surgery of trauma guidelines committee. *J Trauma Acute Care Surg*. 2019;86:737–743.
20. Mosenthal AC, Murphy PA, Barker LK, et al. Changing the culture around end-of-life care in the trauma intensive care unit. *J Trauma*. 2008;64:1587–1593.