RESEARCH

CE
1.5
ANCC
Contact
Hours

Nurse Practitioners' Role in Improving Service for Elderly Trauma Patients

Audis Bethea, PharmD, BCPS, BCCCP ■ Damayanti Samanta, MS ■ Teresa White, APRN, FNP-BC ■ Nancy Payne, APRN, FNP-C ■ Jessica Hardway, APRN, FNP-C

ABSTRACT

Preexisting conditions and decreased physiological reserve in the elderly frequently complicate the provision of health care in this population. A Level 1 trauma center expanded its nurse practitioner (NP) model to facilitate admission of low-acuity patients, including the elderly, to trauma services. This model enabled NPs to initiate admissions and coordinate day-to-day care for low-acuity patients under the supervision of a trauma attending. The complexity of elderly trauma care and the need to evaluate the efficacy of management provided by NPs led to the development of the current study. Accordingly, this study endeavored to compare outcomes in elderly patients whose care was coordinated by trauma NP (TNP) versus nontrauma NP (NTNP) services. Patients under the care of TNPs had a 1.22-day shorter duration of hospitalization compared with that of the NTNP cohort (4.38 ± 3.54 vs. 5.60 ± 3.98, $p = .048$). Decreased length of stay in the TNP cohort resulted in an average decrease in hospital charges of $13,000 per admission ($38,053 ± $29,640.76 vs. $51,317.79 ± $34,756.83, $p = .016$). A significantly higher percentage of patients admitted to the TNP service were discharged home (67.1% vs. 36.0%, $p = .002$), and a significantly lower percentage of patients were discharged to skilled nursing facilities (25.7% vs. 51.9%, $p = .040$). These clinical and economic outcomes have proven beneficial in substantiating the care provided by TNPs at the study institution. Future research will focus on examining the association of positive outcomes with specific care elements routinely performed by the TNPs in the current practice model.

Key Words

Elderly care, Nurse practitioner, Trauma

Clinical management of trauma patients is resource-intensive, as these patients often present with complex injuries requiring collaboration of specialists from multiple disciplines (Dutton et al., 2003). This is increasingly evident in the management of elderly trauma patients. Diminished physiologic reserve, a higher frequency of preexisting conditions, and a higher incidence of chronic illness contribute to challenges experienced in the provision of care for these patients (Katrancha, Zipf, Abrahams, & Schroeder, 2017; Kirshenbom, Ben-Zaken, Albilya, Niyibizi, & Bala, 2017). Accordingly, elderly patients carry an elevated risk for mortality, functional impairment, and loss of independence compared with their younger counterparts following traumatic injury (Olufajo et al., 2016). With a growing elderly population, the challenges experienced by institutions to provide optimal geriatric care continue to rise, further taxing an already stressed infrastructure for patient care. Rising costs, declining reimbursements, and limitations on resident work hours have challenged health systems to develop new and streamlined processes through which the quality of patient care can be maintained while also preserving institutions' economic stability (Dutton et al., 2003; Haan et al., 2007; Morris et al., 2012). In an effort to maintain operational efficiency, many institutions utilize nonphysician providers to facilitate the provision of patient care (Morris et al.; Rejtar, Ranstrom, & Allcox, 2017; Sise et al., 2011). Similarly, the trauma service at the study institution has explored opportunities to enhance efficiency and continuity of care through the addition of trauma nurse practitioners (TNPs).

The trauma service began expanding its nurse practitioner (NP) model in September 2013. Beginning in December 2014, low-acuity patients presenting at the study institution could be admitted to trauma services under the care of TNPs. Through the implementation of this new process, the department sought to increase the proportion of low-acuity patients who were admitted to trauma services. A protocol and an order set were created to streamline the admission process. Additional TNP practices were established that targeted accomplishing the following tasks within the first 24-hours of admission: communication with patients' family to describe plans of care, assessment of predetermined discharge disposition

Author Affiliations: Center for Health Services and Outcomes Research (Dr Bethea and Ms Samanta), Charleston Area Medical Center (Mss White, Payne, and Hardway), Charleston, West Virginia.

The authors have no conflict of interest to report.

Correspondence: Audis Bethea, PharmD, BCPS, BCCCP, West Virginia Clinical and Translational Science Institute, 3211 MacCorkle Ave SE, Charleston, WV 25304 (audis.bethea@camc.org).

DOI: 10.1097/JTN.0000000000000445

criteria, engagement of social workers to facilitate discharge planning, assessment of home medications, patient mobility, facilitation of incentive spirometry, and expedition of physical therapy involvement in patients' care.

Following admission, low-acuity patients were managed by a weekly rotating team consisting of two TNPs providing bedside care in tandem with a trauma attending. The process was first piloted in orthopedic patients with low acuity. After a successful 6-month pilot, additional subsets of trauma patients who were previously admitted to hospitalist services with sub-specialty consults (neurosurgical, oromaxillofacial, etc.) were allocated to the TNP service. Because of the challenges presented by the clinical management of elderly trauma patients and the need to further substantiate the quality of care provided by the institution's TNP model, the current study endeavored to evaluate outcomes in elderly trauma patients admitted to the study institution since the inception of the current TNP model.

PURPOSE

To demonstrate the impact of the TNP model, trauma leadership sought to evaluate the quality of care provided to elderly trauma patients. Accordingly, the current study aimed to compare outcomes in elderly patients whose care was coordinated by the TNPs versus nontrauma NPs (NTNPs).

RESEARCH QUESTIONS/HYPOTHESIS

Elderly trauma patients managed under the TNP model would have superior outcomes when compared with patients admitted to other surgical and nonsurgical services during the same time period.

METHODS

This is a retrospective cohort study of trauma patients admitted to a Level 1 trauma center between December 2014 and June 2017. Patients included in this study were 65 years or older and had an Injury Severity Score (ISS) of 10 or less. Included patients were admitted to noncritical patient care areas within the trauma center following initial presentation to the study institution. Those meeting inclusion criteria were divided into two patient care groups: admission to TNP or NTNP services.

Following approval from the institution's review board, patients were identified and data were obtained through the institution's trauma registry. Data included the following patient characteristics and outcome variables: age, ISS, gender, pre-existing comorbidities, admitting injuries, hospital length of stay (LOS), incidence of unplanned intensive care unit (ICU) admissions, discharge location, rate of 30-day readmission, in-hospital complications, in-hospital mortality, and total charges for respective hospitalizations. Hospital LOS data were analyzed for patients whose stay was 24-hours or more in duration. Evaluated complications were categorized into hematological, cardiovascular, infections, pulmonary, genitourinary, musculoskeletal, integumentary, substance withdrawal, gastrointestinal, surgical, and neurological groups.

Data analysis was conducted with IBM-SPSS 22.0 (IBM Corp, Armonk, NY). Descriptive statistics were computed for each variable to describe the patient population. Means and standard deviations were conducted for continuous variables, whereas proportions and frequencies were reported for categorical variables. Continuous variables were compared using independent t or Mann–Whitney U tests, and categorical variables were compared using chi-square or Fisher's exact tests. Study outcome variables including hospital LOS, incidence of unplanned ICU admissions, discharge location, in-hospital mortality, rate of 30-day readmission, and complications during hospital stay were analyzed with analysis of covariance or binary logistic regression adjusting for differences in patient characteristics. Significance was reported at a level of $p \leq .05$.

RESULTS

A total of 1,363 patients were included in this analysis (Table 1). One hundred forty patients were admitted to

TABLE 1 Patient Demographics

	TNP (N = 140)	NTNP (N = 1,223)	p[a]
Demographics			
Age	74.99 ± 8.08	80.63 ± 8.70	**.000**
Injury Severity Score	6.02 ± 2.56	7.25 ± 2.69	**.000**
Gender (male)	39 (27.9%)	365 (29.8%)	.626
Comorbidities			
Neurological	27 (19.3%)	355 (29.0%)	**.015**
Pulmonary	5 (3.6%)	186 (15.2%)	**.000**
Gastrointestinal	2 (1.4%)	11 (0.9%)	.635
Cardiovascular	98 (70.0%)	1,001 (81.8%)	**.001**
Psychiatric	27 (19.3%)	200 (16.4%)	.378
Malignancy	2 (1.4%)	14 (1.1%)	.676
Renal failure	2 (1.4%)	15 (1.2%)	.691
Immunodeficiency	3 (2.1%)	30 (2.5%)	1.000
Diabetes	35 (25.0%)	251 (20.5%)	.218
Immunological	9 (6.4%)	35 (2.9%)	**.038**
Substance use	6 (4.3%)	46 (3.8%)	.647
Obesity	4 (2.9%)	27 (2.2%)	.551
Anticoagulant therapy	2 (1.4%)	18 (1.5%)	.968

Note. NTNP = nontrauma nurse practitioner; TNP = trauma nurse practitioner.

[a]*Bold values indicate statistical significance ($p \leq .05$).*

the TNP service and 1,223 to the nontrauma service. The NTNP service cohort consisted of patients admitted to hospitalists (90.4%), orthopedics (6.5%), plastic surgery (1.6%), oromaxillofacial (0.5%), and neurosurgical services (1.1%). Baseline demographics were similar between the comparator groups with the exception of age (74.99 ± 8.08 vs. 80.63 ± 8.70, $p = .000$) and ISS (6.02 ± 2.56 vs. 7.25 ± 2.69, $p = .000$), which were significantly lower in the TNP cohort. Comorbidities were also similar between the comparator groups with the exception of pulmonary, cardiovascular, neurological, and immunological diseases. The TNP cohort had significantly less pulmonary (3.6% vs. 15.2%, $p = .000$), neurological (19.3% vs. 29.0%, $p = .015$), and cardiovascular (70.0% vs. 81.8%, $p = .001$) disease states. In contrast, immunological diseases were significantly higher in the TNP cohort (6.4% vs. 2.9%, $p = .038$). Admitting injuries were also compared between the study cohorts. The TNP cohort had a significantly higher percentage of traumatic brain injury (11.4% vs. 4.8%, $p = .001$), dislocation, (5.7% vs. 0.8%, $p = .000$), sprain and strain (7.9% vs. 1.2%, $p = .000$), upper extremity fractures (30.7% vs. 13.2%, $p = .000$), and vertebral injuries (17.1% vs. 6.2%, $p = .000$). Lower extremity fractures, however, were significantly more prominent in the NTNP service cohort (41.4% vs. 67.0%, $p = .000$) (Table 2). The significant differences observed in these baseline variables were accounted for in multivariate analyses conducted for all outcome measures.

Comparisons of outcome variables revealed a significant difference in hospital LOS between the two cohorts. Patients under the care of TNPs had a shorter duration of hospitalization (1.22 days) compared with that of the NTNP service cohort (4.38 ± 3.54 vs. 5.60 ± 3.98, $p = .048$). Differences in LOS likely contributed to a significant decrease in average hospital charges between the compared cohorts, with charges for hospitalizations on the TNP service averaging $13,000 less per admission ($38,053 ± $29,640.76 vs. $51,317.79 ± $34,756.83, $p = .016$).

The majority of the patients in both cohorts were either discharged to their home or a skilled nursing facility. Comparison of the arms, however, revealed that a significantly higher percentage of patients admitted to the TNP service were discharged home (67.1% vs. 36.0%, $p = .002$) and a significantly lower percentage of patients from the TNP team were discharged to skilled nursing facilities (25.7% vs. 51.9%, $p = .040$) (Table 2). Despite the differences in the incidence in which patients were discharged home versus skilled nursing facilities, 30-day readmission rates remained similar between the study cohorts (Table 3).

Unplanned ICU admissions were lower in the TNP cohort (1.4% vs. 2.1%, $p = .946$); however, this decrease did not achieve statistical significance. Although there were no deaths in the TNP cohort, mortality rates were found to be similar to that seen with the NTNP cohort (0.0% vs. 1.1%, $p = .996$) (Table 3). Complications organized by the

TABLE 2 Admission Injuries

	TNP ($N = 140$)	NTNP ($N = 1,223$)	p[a]
Oromaxillofacial	3 (2.1%)	23 (1.9%)	.744
Traumatic brain injury	16 (11.4%)	59 (4.8%)	**.001**
Peripheral nervous system	1 (0.7%)	4 (0.3%)	.419
Spinal cord injury	0 (0.0%)	1 (0.1%)	1.000
Dislocation	8 (5.7%)	10 (0.8%)	**.000**
Sprain and strain	11 (7.9%)	15 (1.2%)	**.000**
Upper extremity fracture	43 (30.7%)	162 (13.2%)	**.000**
Lower extremity fracture	58 (41.4%)	820 (67.0%)	**.000**
Pelvic fracture	10 (7.1%)	85 (7.0%)	.932
Other orthopedic injuries	2 (1.4%)	3 (0.2%)	.085
Cardiovascular	0 (0.0%)	4 (0.3%)	1.000
Thoracic	4 (2.9%)	17 (1.4%)	.262
Vertebral	24 (17.1%)	76 (6.2%)	**.000**

Note. NTNP = nontrauma nurse practitioner; TNP = trauma nurse practitioner.

[a]*Bold values indicate statistical significance ($p \leq .05$).*

TABLE 3 Study Outcomes

	TNP ($N = 140$)	NTNP ($N = 1,223$)	p[a]
Hospital length of stay (days)	4.38 ± 3.54	5.60 ± 3.98	**.048**
Unplanned ICU admission	2 (1.4%)	26 (2.1%)	.867
Discharge location			
Home	94 (67.1%)	436 (36.0%)	**.002**
Skilled nursing facility	36 (25.7%)	629 (51.9%)	**.040**
In-hospital mortality	0 (0.0%)	14 (1.1%)	.995
30-day readmission	1 (0.7%)	11 (0.9%)	.449
Hospitalization charges	$38,053 ± $29,640.76	$51,317.79 ± $34,756.83	**.016**

Note. ICU = intensive care unit; NTNP = nontrauma nurse practitioner; TNP = trauma nurse practitioner.

[a]*Bold values indicate statistical significance ($p \leq .05$).*

organ system affected (e.g., acute lung injury allocated to the pulmonary complication group) or grouped broadly by describing the complication (e.g., urinary tract infection allocated to the infection complication group) were compared and found to be similar between the study cohorts (Table 4).

DISCUSSION

It has been proposed that by 2050, patients 65 years or older will comprise 40% of all trauma patients (Tillou et al., 2014). These increasing numbers of elderly traumas present a unique challenge in the provision of medical care, as the elderly respond to traumatic injury differently than younger patients do. The altered response of the elderly patient is thought to be multifactorial likely resulting from a lower physiological reserve, an increased number of preexisting conditions, and a higher incidence of chronic illness (Katrancha et al., 2017; Kirshenbom et al., 2017). This paradigm is supported by literature evaluating outcomes with geriatric trauma patients, suggesting that age, injury burden, and baseline functional status are predictive of mortality or discharge to a skilled nursing facility (Kirshenbom, et al., 2017; Richmond, Kauder, Strmpf, & Meredith, 2002). Furthermore, preexisting comorbidities, common to this patient population, result in a threefold increase in complication rates during hospital admission (Richmond et al., 2002). As a result, elderly patients are at a much higher risk for poor outcomes than their younger counterparts following traumatic injury. Accordingly, existing literature emphasizes the need for focused care to improve outcomes in the geriatric trauma patient population (Fallon et al. 2006).

In December 2014, the Level 1 trauma center at the study institution implemented a practice model through which patients with low acuity were admitted to a TNP service with attending physician oversight. Given the challenges presented by the elderly patient population and an ongoing need to evaluate the quality of care provided by the TNP service model, the current study was developed for this select patient population. Current literature has frequently examined the impact of TNPs on the morbidity and mortality of trauma patients; however, there is a paucity of data examining the impact of patient care driven by TNPs in improving outcomes in geriatric trauma patients (Christmas et al., 2005; Collins et al., 2014; Holliday, Samanta, Budinger, Hardway, & Bethea, 2017; Nyberg, Waswick, Wynn, & Keuter, 2007; Sise et al., 2011). In the current study, elderly patients managed by TNPs had a significantly lower hospital LOS. In addition, the NP service was able to discharge a significantly higher percentage of patients home than skilled nursing facilities. Similar endpoints have been evaluated in previous studies; however, as previously mentioned, these studies' foci have not been specific to elderly trauma patients. Despite substantiating the impact of NPs in the provision of care to the trauma patient population, extrapolation of these studies' findings to the elderly patient population is limited (Christmas et al., 2005; Collins et al., 2014; Holliday et al., 2017; Sise et al., 2011).

Existing geriatric literature has evaluated practice models directed toward the provision of optimal trauma care. Initial publications described processes that focused on timely identification and thorough management of comorbidities through the consultation of a geriatrician. The incorporation of this care model was shown to improve mortality in elderly trauma patients in a study by Fallon et al. in 2006. Examples of geriatrician interventions in this model included the identification of inappropriate medication use, assistance in pain management, facilitation of advanced care planning, discharge disposition, and the recognition and management of delirium. Additional data from Mangram et al. (2012) demonstrated improvement in outcomes in geriatric trauma patients receiving care from a multidisciplinary team providing care exclusively to trauma victims who were older than 60 years. This model also resulted in improvements in duration of emergency department stay, time to surgical intervention, intensive care, and hospital LOS, as well as select posttrauma complications (Mangram et al., 2012). Data evaluating these models as well as additional data reported by Lenartowicz et al. (2012) prompted the American College of Surgeons to use the Trauma Quality Improvement Program as a platform to disseminate guidelines for the management of geriatric trauma patients (American College of Surgeons, 2018; Lenartowicz et al., 2012).

TABLE 4 Complications

	TNP (N = 140)	NTNP (N = 1,223)	p
Hematological	15 (10.7%)	255 (20.9%)	.731
Cardiovascular	9 (6.4%)	90 (7.4%)	.848
Infection	5 (3.6%)	42 (3.4%)	.581
Pulmonary	4 (2.9%)	36 (2.9%)	.731
Genitourinary	2 (1.4%)	45 (3.7%)	.441
Musculoskeletal and integumentary	0 (0.0%)	7 (0.6%)	.995
Substance withdrawal	0 (0.0%)	4 (0.3%)	.995
Gastrointestinal	0 (0.0%)	3 (0.2%)	1.000
Surgical	1 (0.7%)	4 (0.3%)	.793
Neurological	0 (0.0%)	8 (0.7%)	.996

Note. NTNP = nontrauma nurse practitioner; TNP = trauma nurse practitioner.

Literature clearly supports the paradigm that outcomes in elderly trauma patients are improved with the integration of specialized, focused care through geriatric consultations or the utilization of practitioners who maintain a focus on the specialized needs of this patient population (Fallon et al., 2006; Katrancha et al., 2017; Lenartowicz et al., 2012; Mangram et al., 2012; Olufajo et al., 2016; Tillou et al., 2014). These studies support the concept that early risk identification during hospitalization and smooth transition to discharge disposition are critical. Risk identification involves evaluation of preexisting cognitive and functional impairments, review of medications, social history, nutritional status, and advanced directives (Katrancha et al., 2017; Olufajo et al., 2016; Tillou et al., 2014). Similarly, the TNP care model at the study institution fosters similar practices and therefore improvements in outcomes identified by the current study resonate with the current literature.

Factors influencing outcomes in this study likely include the routine evaluation of patients upon admission with preset discharge disposition criteria and collaboration with social workers to initiate discharge planning within the first 24-hours of admission. During the initial 24-hours of admission, TNPs also evaluate home treatment regimens and communicate with patients' family to describe plans of care. In addition, the TNP care model emphasizes early patient mobility. Nurse practitioners make frequent bedside visits, assist patients with walking, and coordinate prompt placement of orders for physical therapy and behavioral medicine consults when applicable. Trauma nurse practitioners also formally evaluate these patients' incentive spirometry at least every 24-hours to ensure that pulmonary function is being maintained.

Economic endpoints of hospital cost and charges were also lower in the patients admitted to the TNP group. Specifically, per patient savings of $13,000 were seen when hospital charges were compared between the cohorts. These findings projected the potential for $1.8 million in decreased charges in the event that all patients included in the study were admitted to the TNP service. Similar endpoints have been previously examined by Collins et al. and Sisse et al. These studies also reported significant reductions in cost and hospital charges associated with the care of trauma patients following the integration of NPs into their practices.

LIMITATIONS

A large number of patients were included in this evaluation; however, the proportion of patients allocated to each respective arm was not uniform. In addition, the retrospective design of the current study makes it reliant upon the identification, availability, and completeness of patients' medical records. Accordingly, all patients admitted to the trauma center during the study period may not have been identified and included, resulting in selection bias. In addition, the validity of the evaluated data depends on the accuracy with which they have been documented and subsequently collected. This serves to limit researchers' ability to practice quality control with the data. The study also does not seek to establish a causal relationship between the implementation of the NP service model and positive outcomes. It only describes the changes in outcomes reported between the study arms.

CONCLUSIONS

The findings of the current study support the impact of the TNP practice model implemented at the study institution. Significant improvements in hospital LOS, the frequency with which elderly patients were discharged home, and economic outcomes were identified. These data add to the growing body of literature suggesting that outcomes in elderly trauma patients are improved with the utilization of practitioners who maintain a focus on the specialized needs of this patient population. These findings, however, provide inaugural data highlighting a practice model in which NPs' direction of bedside patient management has been associated with a significant enhancement in the care of elderly trauma patients. Accordingly, similar models initiated at other trauma centers may facilitate comparable improvements in outcomes. Moving forward additional research may endeavor to further delineate the impact of specific components and activities routinely performed by the TNPs in the current practice model.

KEY POINTS

- The current study supports the value of patient care coordinated by NPs in the elderly trauma patient population.
- Data revealed improvements in hospital LOS, percentage of patients discharged home, and hospital charges associated with the care of elderly trauma patients in the NP cohort.
- Further investigation should endeavor to evaluate routine components of the NP practice model to further substantiate current practices.

REFERENCES

American College of Surgeons. (2018, September 10). *Geriatric trauma management guidelines. American College of Surgeons Trauma Quality Improvement Program.* Retrieved from https://www.facs.org/~/media/files/quality%20programs/trauma/tqip/geriatric%20guide%20tqip.ashx

Christmas, A. B., Reynolds, J., Hodges, S., Franklin, G. A., Miller, F. B., Richardson, J. D., & Rodriguez, J. L. (2005). Physician extenders impact trauma systems. *The Journal of Trauma, 58*(5), 917–920.

Collins, N., Miller, R., Kapu, A., Martin, R., Morton, M., Forrester, M., … Wilkinson, L. (2014). Outcomes of adding acute care nurse practitioners to a Level I trauma service with the goal of decreased length of stay and improved physician and nursing satisfaction. *The Journal of Trauma and Acute Care Surgery, 76*(2), 353–357.

Dutton, R. P., Cooper, C., Jones, A., Leone, S., Kramer, M. E., & Scalea, T. M. (2003). Daily multidisciplinary rounds shorten length of stay for trauma patients. *The Journal of Trauma*, *55*(5), 913–919.

Fallon, W. F., Rader, E., Zyzanski, S., Mancuso, C., Martin, B., Breedlove, L., … Campbell, J. (2006). Geriatric outcomes are improved by a geriatric trauma consultation service. *The Journal of Trauma*, *61*(5), 1040–1046.

Haan, J. M., Dutton, R. P., Willis, M., Leone, S., Kramer, M. E., & Scalea, T. M. (2007). Discharge rounds in the 80-hour workweek: Importance of the trauma nurse practitioner. *The Journal of Trauma*, *63*(2), 339–343.

Holliday, A., Samanta, D., Budinger, J., Hardway, J., & Bethea, A. (2017). An outcome analysis of nurse practitioners in acute care trauma services. *Journal of Trauma Nursing*, *24*(6), 365–370.

Katrancha, E. D., Zipf, J., Abrahams, N., & Schroeder, R. (2017). Retrospective evaluation of the impact of a geriatric trauma institute on fragility hip fracture patient outcomes. *Orthopedic Nursing*, *36*(5), 330–334.

Kirshenbom, D., Ben-Zaken, Z., Albilya, N., Niyibizi, E., & Bala, M. (2017). Older age, comorbid illnesses, and injury severity affect immediate outcome in elderly trauma patients. *Journal of Emergency Trauma Shock*, *10*(3), 146–150.

Lenartowicz, M., Parkovnick, M., McFarlan, A., Haas, B., Straus, S. E., Nathen, A. B., & Wong, C. L. (2012). An evaluation of a proactive geriatric trauma consultation service. *Annals of Surgery*, *256*(6), 1098–1101.

Mangram, A. J., Mitchell, C. D., Shifflette, V. K., Lorenzo, M., Truitt, M. S., Goel, A., … Nichols, D. J. (2012). Geriatric trauma service: A one-year experience. *The Journal of Trauma and Acute Care Surgery*, *72*(1), 119–122.

Morris, D. S., Reilly, P., Rohrbach, J., Telford, G., Kim, P., & Sims, C. A. (2012). The influence of unit-based nurse practitioners on hospital outcomes and readmission rates for patients with trauma. *The Journal of Trauma and Acute Care Surgery*, *73*(2), 474–478.

Nyberg, S. M., Waswick, W., Wynn, T., & Keuter, K. (2007). Midlevel providers in a Level I trauma service: Experience at Wesley Medical Center. *The Journal of Trauma*, *63*(1), 128–134.

Olufajo, O. A., Tulebaev, S., Javedan, H., Gates, J., Wang, J., Duarte, M., … Cooper, Z. (2016). Integrating geriatric consults into routine care of older trauma patients: One-year experience of a Level I trauma center. *Journal of the American College of Surgeons*, *222*(6), 1029–1035.

Rejtar, M., Ranstrom, L., & Allcox, C. (2017). Development of the 24/7 nurse practitioner model on the inpatient pediatric general surgery service at a large tertiary care children's hospital and associated outcomes. *Journal of Pediatric Health Care*, *31*(1), 131–140.

Richmond, T. S., Kauder, D., Strmpf, N., & Meredith, T. (2002). Characteristics and outcomes of serious traumatic injury in older adults. *Journal of the American Geriatrics Society*, *50*(2), 215–222.

Sise, C. B., Sise, M. J., Kelley, D. M., Walker, S. B., Calvo, R. Y., Shackford, S. R., & Osler, T. M. (2011). Resource commitment to improve outcomes and increase value at a Level I trauma center. *The Journal of Trauma*, *70*(3), 560–568.

Tillou, A., Kelley-Quon, L., Burruss, S., Morley, E., Cryer, H., Cohen, M., & Min, L. (2014). Long-term postinjury functional recovery: Outcomes of geriatric consultation. *JAMA Surgery*, *149*(1), 83–89.

Instructions:

- Read the article. The test for this CE activity is to be taken online at http://www.NursingCenter.com/CE/JTN.
- You will need to create (it is free!) and login to your personal CE Planner account before taking online tests. Your planner will keep track of all your Lippincott Professional Development online CE activities for you.
- There is only one correct answer for each question.
- A passing score for this test is 13 correct answers. If you pass, you can print your certificate of earned contact hours and access the answer key. If you fail, you have the option of taking the test again at no additional cost.
- Questions? Contact Lippincott Professional Development: 800-787-8985.

Registration Deadline: June 4, 2021

Provider Accreditation:

LPD will award 1.5 contact hours for this continuing nursing education activity.

LPD is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 1.5 contact hours. Lippincott Professional Development is also an approved provider of continuing nursing education by the District of Columbia, Georgia, and Florida #50-1223. Your certificate is valid in all states.

Disclosure Statement:

The authors and planners have disclosed that they have no financial relationships related to this article.

Payment and Discounts:

- The registration fee for this test is FREE for STN members and $17.95 for nonmembers.
- STN members can take JTN CE for free using the discount code available in the members-only section of the STN website. Use the discount code when payment is requested during the check-out process.

DOI: 10.1097/JTN.0000000000000456