

Research Article

What A Change A Year Makes: Orthopedic Case Volume After ACS-Level II Trauma Status

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Keywords: orthopedics, trauma, ACS, staffing and scheduling

<https://doi.org/10.60118/001c.141827>

Journal of Orthopaedic Experience & Innovation

Vol. 6, Issue 2, 2025

Background

This study compares orthopedic trauma case volumes at an urban hospital before and after ACS Level II Trauma designation. We hypothesized a significant increase in both volume & case complexity following this designation which impacts hospital operations and personnel needs.

Methods

This retrospective study analyzed prospectively collected data on orthopedic trauma cases at an urban Level II center for the year before and after accreditation. Data collected included injury/surgery details, case urgency and surgery day/weekend timing. Data analysis was conducted using SPSS (IBM Corp., Armonk, NY) and Microsoft Excel. Independent t-tests assuming unequal variances were performed for comparison. A p-value of < 0.05 was considered statistically significant.

Results

There was a significant increase in overall case volume ($P < 0.001$), including urgent ($P < 0.001$) & emergent cases ($P = 0.002$). Significant growth was observed in periarticular

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- c Dr. Lisa Cannada is an Orthopaedic Trauma Surgeon. She is affiliated with Novant health, where she is the Director of Faculty Integration for the UNC School of Medicine Charlotte Campus, Medical Student Clerkship Director and Professor. She completed a 3-year term on the AAOS BOD in 2018 as the first female Chair of the Board of Specialty Societies. She was responsible for developing the current fellowship match process for orthopaedics. She is a member of the Orthopaedic Trauma Association and serves on the BOD as Match Compliance Chair and received the first OTA DEI and Health Disparities Leadership Award in October 2022. She served as a president of the Ruth Jackson Orthopaedic Society in 2011 and received the inaugural "She for She" Award in 2022. Dr. Cannada has made it her mission to make the path better for those that follow, by her work and leadership roles. In 2021, Drs. Jennifer Weiss, Nancy Yen Shipley and Arianna Gianakos and Dr. Cannada formed "Speak Up Ortho" to pave the way for change in orthopaedic surgery. Her clinical interests and research include both upper and lower extremity fractures and outcomes. She has over 240 publications and 250 presentations at national meetings. She could not do this without the support of her family, her husband Jeff and daughter Annalise and her parents, the late John W. Metcalf MD and her mom, Theresa Metcalf. Her favorite role is "soccer mom", cheering for her daughter, a D1 collegiate soccer player at Lipscomb in Nashville.

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tibial plateau ($P < 0.001$) and femoral shaft fractures ($P < 0.001$). An increase in distal femur ($P = 0.073$), open tibial shaft ($P = 0.189$), closed tibial shaft ($P = 0.05$), and periarticular pilon fractures ($P = 0.210$) were also observed. Significant increases were noted in ballistic fractures ($P < 0.001$) and open fractures ($P < 0.001$). A notable rise in cases occurred on both weekends ($P = 0.049$) and weekdays ($P < 0.001$), demonstrating the impact of the accreditation.

Conclusion

Our data demonstrates transition to an ACS Level II Trauma Center led to increases in caseload and complexity. This highlights the need for adjustments in operating room access, staffing and scheduling to accommodate these demands. This also represents an increase in opportunities for trainees, supporting the importance of trauma center access in education. Further studies into the impact of change in ACS designation level and how it affects case volume distribution across are warranted.

1. INTRODUCTION

Trauma centers are healthcare facilities with the resources and ability to treat all kinds of critical injuries threatening life or limbs (Schubert et al. 2019). A facility is designated a level for which defines a set criterion that the facility must meet. Additionally, it categorizes facilities based on the resources available and capacity to address various traumas (Southern and Celik 2025). There is no national standard criteria for each designation level with every state having their own criteria which they use to designate their respective facilities (Southern and Celik 2025; Lundy et al. 2019). In attempts to standardize trauma levels, the American College of Surgeons (ACS) established a set criteria for level designations I-III for which facilities can pursue verification by the ACS (American College of Surgeons CoT 2023). Studies have demonstrated an overall benefit on patient outcomes, their care, and an overall increased cost effectiveness when institutions pursue ACS verification (DiRusso, Holly, Kamath, et al. 2001; Piontek et al. 2003).

This study focuses on trauma center designation and the implications of this designation. In general, the ACS defines a level I trauma center as a facility that has the capability to provide total care for every aspect of injury ranging from prevention through rehabilitation (Southern and Celik 2025). Furthermore, they are expected to play a key role in advancing trauma care through research, regional disaster planning, and support trauma centers locally (American College of Surgeons CoT 2023). Level II have the capacity to provide trauma care for a wide range of trauma injuries with the addition of taking some responsibility in disaster planning and education within their respective region (American College of Surgeons CoT 2023). Lastly, level III is defined as an institution that aims to address trauma care deficiencies in more remote or rural areas of the United States. Level III centers are to provide care for mild to moderate injuries and the ability to evaluate, manage, and transport any patient requiring resources exceeding those facilities capabilities (American College of Surgeons CoT 2023).

An urban hospital located in the Southeast region of the United States was recognized by the ACS as a Level II Trauma Center on December 18, 2023. Previously, this institution was a state designated level III trauma center. This

increase in trauma level designation brings about increased services to treat the patient. However, it also brings increased responsibilities and requirements for hospitals to provide adequate patient care. The city in which this hospital is established is a rapidly growing city, according to the United States Census Bureau (Bureau 2025). With an increased population comes an increase in trauma cases. The results of this study can help inform hospital policy to keep up with the demands of growing cities.

The purpose of this study is to compare orthopedic trauma case volume at an urban Southeastern hospital before and after achieving ACS Level II Trauma accreditation on December 18, 2023, to review the increases in case volumes and complexity and need for operating room availability and staffing. This study will also evaluate whether there is a significant difference between the number of weekday and weekend cases, the number of emergent cases, gunshot wounds, and tibia and femur cases before and after becoming an ACS Level II Trauma center. We hypothesize that there will be a significant increase in surgical volume and case complexity after becoming an ACS Level II Trauma Center.

2. METHODS

IRB approval was not required as this was a quality study completed at the request of the hospital and all data points were provided by the hospital with no identifying data. Patient records were not reviewed for clinical outcomes. A retrospective quality study of prospective collected data including all orthopedic surgical trauma cases performed at an urban Southeastern hospital between December 18, 2022, to December 18, 2024, by the orthopedic trauma team and its on-call surgeons.

The variables collected included procedure completed, surgeon, body part involved, level of case urgency, injury mechanism (gunshot wound, open fracture or other), and the day of the week the surgery occurred. Weekday surgeries were defined as Monday, Tuesday, Wednesday and Thursday and weekend cases were defined as Friday, Saturday and Sunday. Additionally, hospital recognized holidays were also classified as weekend cases. This included Christmas Day, Thanksgiving Day, New Years Day, Memorial Day, Good Friday, Independence Day, and Labor Day.

Table 1. Case Volumes, Complexity and Day Classification.

	Before		After	
	Total	Mean	Total	Mean
Case Volume	687	1.88	865 _a	2.36
Urgent Cases	266	0.72	402 _a	1.09
Emergent Cases	9	0.02	27 _a	0.07
Weekends	244	1.51	281 _a	1.73
Weekdays	447	1.22	595 _a	1.63

Note: Within each dependent measure, totals with different subscripts (_a) differ significantly ($p < 0.05$)

Elective cases were defined as cases that could wait over 24 hours to perform such as wrist or ankle fractures. Urgent cases were defined as cases that needed to be performed within 24 hours such as irrigation and debridement of an open fracture or hip and femur fractures. Emergent cases were defined as life/limb threatening cases that need surgery within one hour such as compartment syndrome and necrotizing fasciitis.

The data was then analyzed using SPSS (IBM Corp., Armonk, NY) and Microsoft Excel. Independent t-tests assuming unequal variances were used to compare the various variables before and after December 18, 2023. A p-value of $p < 0.05$ was determined to yield statistical significance.

3. RESULTS

This study compared the difference between multiple variables before and after December 18, 2023, to determine if the transition to a Level II Trauma Center impacted the orthopedic trauma cases at this Southeastern hospital. Following accreditation, there was a significant increase in overall case volume ($P < 0.001$), including urgent cases ($P < 0.001$) and emergent cases ($P = 0.002$). After December 18, 2023, a significant rise in cases occurred on both weekends ($P = 0.049$) and weekdays ($P < 0.001$).

Significant growth was also observed in certain fracture types, including tibial plateau ($P = 0.001$) and femoral shaft ($P < 0.001$). There were non-significant increases in the number of distal femur ($P = 0.073$), periarticular pilon ($P = 0.210$), open tibial shaft ($P = 0.189$), and closed tibial shaft ($P = 0.050$) fractures. Additionally, there were increases observed in ballistic fractures ($P < 0.001$) and open fractures ($P < 0.001$).

4. DISCUSSION

The results of this study show that the change in status to an ACS Level II Trauma Center, at a Southeastern urban hospital, represented a significant increase in its orthopedic trauma case volume and requirements. Tsai et al similarly found that a hospital's change in trauma status led to higher total volume of patients (Tsai M, Osgood M, Canner M, et al. 2021).

This change typically means that the hospital needs to be equipped to handle a broader range of trauma cases, including more complex injuries that require specialized care

and resources. As designation changes to a higher level of status, meeting ACS requirements for staffing with fellowship trained orthopaedic trauma surgeons is something that must be planned for to accommodate the increased load. Our center hired an additional Board Certified, fellowship trained Orthopaedic Trauma Surgeon prior to the change in anticipation of the increased case complexity and volume. Studies suggest that with changes in trauma level designation status there was an increase of case complexity and adverse outcomes during hospitalization indicating greater need for specialized care (Tsai M, Osgood M, Canner M, et al. 2021).

Adjustments in staffing, scheduling, and operating room availability may need to be made by the hospital to meet new demands associated with the change in trauma designation. This may involve hiring additional trauma surgeons, specialized nurses (such as trauma nurses or critical care nurses), anesthesiologists, and other healthcare professionals trained in trauma care. Glance et al showed how a higher proportion of nursing care provided by less skilled nursing staff negatively impacted patient outcomes in level I and II trauma centers, underscoring the need for experienced and well-supported personnel (Glance et al. 2012). Furthermore, studies suggest ACS level II verified institutions had higher rates of survival when compared to their state level counterparts, suggesting the increased requirements for achieving ACS verification positively impacted patient outcomes (Brown, Watson, Forsythe, et al. 2013).

Apart from increasing the number of staff, new and existing staff may need additional training and certification to ensure they are well-versed in trauma protocol and handle the new demands effectively. Studies have shown how teamwork training courses can lead to improved workflow in trauma cases (Gangi, Blaha, Law, et al. 2014). This may be particularly beneficial in aligning teams from different specialties to work cohesively in managing complex cases, while also ensuring that all providers involved in trauma care are proficient in the latest protocols and practices required for Level II designation. The hospital may need to re-evaluate its scheduling practices to ensure adequate coverage for trauma cases, including 24/7 availability of key personnel and on-call schedules for specialists. Beyond scheduling adjustments, structural changes such as designated trauma block time in the operating room schedule, creation of dedicated trauma teams, and flexible protocols for activating OR resources after hours may be necessary

Table 2. Fracture Location and Injury Mechanism

Before			After	
	Total	Mean	Total	Mean
Femoral Shaft	19	0.05	61 _a	0.16
Distal Femur	24	0.06	35	0.96
Periarticular Tibia				
Tibial Plateau	32	0.10	62 _a	0.19
Pilon	2	0.006	4	0.13
Tibial Shaft				
Open Tibial Shaft	8	0.25	12	0.38
Closed Tibial Shaft	25	0.08	38	0.12
Ballistic Fracture	11	0.02	37 _a	0.10
Open Fracture	31	0.08	90 _a	0.25

Note: Within each dependent measure, totals with different subscripts (_a) differ significantly ($p < 0.05$)

to ensure timely and efficient care delivery for complex trauma cases. This also includes ensuring that there are enough resources available during peak trauma times, such as weekends or evenings. This study found that the mean number of cases per day on the weekend was higher when compared to the mean number of cases during the weekdays. This finding is not unique as Brahmhatt et al similarly found higher rates of cases on the weekends when compared to the weekdays (Brahmhatt, Leonard, and Burns 2024). Ensuring that patients facing trauma, especially during times of increased volume, are addressed at a timely manner is important for patient outcomes. Studies have shown how delays in surgery for certain injuries like hip fractures and major trauma, increased patient mortality and shorter times improved patient survival (Hsieh, Hsiao, Chiang, et al. 2022; Pincus, Ravi, Wasserstein, et al. 2017).

The increases in trauma case volume and complexity observed in this study reveal several possible operational challenges associated with the Level II Trauma Center designation. The rise in weekday cases from 447 to 595 and weekend cases from 244 to 281 placed additional strain on existing on-call schedules and staffing models. The increase in emergent procedures and complex injuries, including ballistic trauma and open fractures, also highlights the need for expanded subspecialty coverage and greater perioperative support. Collectively, these increases suggest a roughly 26% rise in total case volume during the post-designation period, which likely taxed operating room availability and surgical scheduling systems.

While these implications are supported by our findings, a comprehensive evaluation of anticipated challenges arising from this designation would require formal qualitative analysis. Interviews or focus groups with hospital leadership, coordinators, and frontline staff could provide valuable insight into the institutional strategies, staffing adaptations, and logistical hurdles encountered during this transition. Such data would complement the quantitative trends presented here and inform best practices for this hospital and other hospitals undergoing similar trauma designation upgrades.

Important institutional metrics, including total OR utilization across specialties, patterns of staff overtime, and the volume of subspecialty consultations, were not captured in this analysis as this study was focused on orthopedic trauma. These broader aspects of resource utilization represent important areas for future investigation.

Possible limitations include the presence of confounding factors. External factors, such as seasonal variations or healthcare policy shifts, could influence trauma case volumes or types, which may not be directly attributable to the Level II designation alone. There were also limited statistical significance in some categories that were investigated. While trends are noted in case types like ballistic fracture fixation and certain fracture types, some results like distal femur fractures did not show significance, which could limit the confidence in observed trends. There may also have been inherent data collection limitations due to reliance on surgeon-reported variables that could introduce subjective variability or bias, especially in classifying case complexity and fracture types. An additional limitation of this study is the lack of transfer and referral data, as the analysis was limited to orthopedic trauma cases. This focus prevented a full assessment of how inter-hospital transfer patterns may have contributed to the observed increase in case volume. Additionally, our dataset does not include EMS transport patterns, transfer origins, or mode of arrival, which represents another limitation. Investigating these factors would be an excellent focus for future research examining the broader impacts on the regional trauma system and would likely require collaboration with EMS services and referring hospitals. Finally, another possible limitation is that this study focuses specifically on orthopedic trauma case volume and complexity following the Level II designation. Although the findings are significant, they do not provide a complete picture of the designation's overall impact, which will require further investigation. The Level II designation may have also expanded the hospital's catchment area, further influencing referral trends that were not directly measured. In addition, potential limitations in data accuracy may arise from human variability in data collection, which could also influence the results.

This Southeastern hospital could use the results of this experiment to implement changes like hiring more providers, adjusting schedules or designating operating rooms specifically for trauma. Specific patient outcomes such as mortality rates, complication rates or length of stay amongst others, could be measured before and after implementing the changes mentioned above. By comparing these metrics, the center can assess the effectiveness of the interventions.

5. CONCLUSION

Overall, the transition to an ACS designated Level II Trauma Center at this urban Southeastern hospital signifies a commitment to enhancing the quality of trauma care provided to the community. However, it also necessitates careful planning and adjustments to ensure that the hospital can effectively meet the increased caseload and complexity associated with this designation. This transition has led to

an increase in the number and complexity of trauma cases. This change requires adjustments in staffing and scheduling to meet the higher demands. Specifically, the hospital may need to hire more trauma specialists, adjust shifts to ensure 24/7 coverage, and provide additional training for staff to handle the new level of trauma care effectively. These adjustments are essential to maintaining high-quality care and responsiveness in emergency situations.

Future research should examine the full spectrum of trauma cases across surgical specialties, including the significant volume of spine cases, which were not captured in this study as they are covered by surgeons outside of our practice. We are currently assessing changes in hand trauma case volume as part of this ongoing effort. Continued evaluation and adaptation will be critical to ensuring that the hospital meets the evolving needs of this trauma designation and maintains the highest standards of care.

Submitted: April 29, 2025 EST. Accepted: July 03, 2025 EST.

Published: November 04, 2025 EST.



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