**American Association for the Surgery of Trauma**

**Multi-Institutional Trial Committee**

**Principal Investigator:** Amelia W. Maiga, MD, MPH **Email:** amelia.w.maiga@vumc.org

**Institution:** Vanderbilt University Medical Center

**Co-investigator(s):** Mayur B. Patel, MD, MPH; Ryan P. Dumas, MD; Michael A. Vella, MD, MBA

**Date:** 8/21/2023

**Title of Proposal:** The Impact of Trauma Video Review on Speed of Hemorrhage Control

**Hypothesis:** We hypothesize that the use of a trauma video review (TVR) program for institutional quality and performance improvement is associated with better outcomes for trauma patients presenting in hemorrhagic shock

**Type of Study: Retrospective**

## Background

**Define the Knowledge Gap that Study Addresses:**

Trauma video review (TVR) is the high-resolution audiovisual recordings of trauma resuscitations in the emergency room for education, performance improvement, and research. TVR has been utilized for quality improvement since the 1960s and is more effective than verbal feedback when used as an educational and performance improvement tool. TVR has also been shown to be superior to real-time prospective data collection for the assessment of trauma team performance and communication. A growing number of level 1 and 2 U.S. trauma centers have active TVR programs. However, the impact of an institutional TVR program on trauma mortality and morbidity among high-acuity patients has not yet been assessed. Does multidisciplinary, team-based systematic video review of trauma resuscitations improve team efficiency and care for the sickest trauma patients in subsequent months and years?

## Study Aim(s):

**Primary Aim:** We aim to evaluate the impact of an institutional TVR program on timely control of traumatic hemorrhagic shock

**Secondary Aim:** We aim to qualitatively interview, explore, and define best practices for establishing a TVR program in a diverse group of level 1 and 2 trauma centers.

## Proposed Study Population

**Inclusion Criteria:**

HOSPITAL CRITERIA: *In order to ensure that we have quantitative retrospective TQIP data from both the pre-TVR and post-TVR time periods, we are specifically limiting our center inclusion criteria to those who implemented a TVR program between January 2018 and December 2021.*
- implementation of TVR program between January 2018 and December 2021 AND
- contributing to TQIP for at least 1 year prior to TVR implementation and through the present AND
- level 1 or level 2 trauma center

PATIENT COHORT CRITERIA (pulled from local TQIP data 2017-2023)
- initial SBP of 90 or less OR blood transfusion within the first 4h of arrival, AND
- hemorrhagic control procedure within first 24 hours (IR or OR)

**Exclusion Criteria:**

Age <16 years

**<u>Outcome Measures:</u>**

**Primary Outcome:** time to hemorrhage control procedure (OR or IR) as recorded by TQIP

**Secondary Outcome(s):** inpatient mortality; death in the emergency room; hospital disposition; and total units of transfused blood product at 24h, all as recorded by TQIP

**Data Collection Variables:**

AIM 1: Patient-level variables (all retrospective data from TQIP)
- month and year of presentation (not PHI)
- age
- initial SBP in ER
- initial HR in ER
- ED GCS
- post-resuscitation GCS (hospital day 2)
- ISS
- AIS by body region
- units of transfused PRBCs, FFP, platelets, and whole blood at 4h and 24h
- ventilator need Y/N
- blunt vs penetrating mechanism
- type of first hemorrhage control procedure
- time from ER arrival to first hemorrhage control procedure
- ED mortality
- inpatient mortality
- time from ER arrival to death, if applicable
- hospital length of stay
- hospital disposition

AIM 2: Hospital-level variables collected via qualitative interview (at least 2 persons per enrolled trauma center, including multidisciplinary perspectives)
- month and year of initiation of TVR program
- description of how TVR program was set-up
- description of TVR program as currently functioning
- background of local TVR champion, if present
- who reviews and selects videos for review
- what criteria are used to select videos for QI/PI review
- are all level 1 resuscitations recorded? miss rate?
- frequency of QI/PI review of TVR videos
- who typically attends QI/PI review of TVR videos (e.g., ED and trauma physicians, if trainees attend which levels, nursing and non-physician staff)
- is attendance mandatory, and if so, for who
- what specific QI/PI concerns have been addressed based on TVR program
- perceived benefit of TVR program
- facilitators of TVR program implementation
- barriers to TVR program implementation
- description of specific TVR AV system and why selected
- approximate funding required to implement TVR program
- approximate number of hours per week required to review videos
- hospital type
- hospital size
- level 1 vs level 2 trauma center
- in-house call Y/N
- MTP available Y/N
- typical trauma team structure during resuscitation (e.g., trauma only, ED roles, anesthesiology, etc.)
- did any major factors affect the speed of hemorrhagic control in your trauma center between the pre-TVR and post-TVR period? (e.g., hiring more experienced trauma surgeons)

**Planned Duration of Study:** 12 months

**Center Participation Goal:** 20 (we have already secured a commitment to participate in this study from 4 trauma centers meeting our eligibility criteria: University of Rochester, Sunnybrook Toronto, Colorado University, and University of Cincinnati)

**Patient Recruitment Goal:** n=500 per center (retrospective using previously collected data for TQIP)

**Power Analysis Performed:** **Yes** ☒ **No** ☐

**Plan for Statistical Analysis:** We will use multivariable modeling to compare the primary and secondary outcomes between hospitals pre-TVR implementation and post-TVR implementation, with each hospital serving as its own control. From our power calculations, enrolling 18 centers will give us 80% power to detect a 4-minute difference in the primary outcome of time to hemorrhage control procedure from the pre-TVR to the post-TVR period. We will also generate a state transition model to compare the median time

hemorrhaging or dead in the period pre-TVR implementation to that in the period post-TVR implementation. Finally, we will perform an interrupted time series analysis (ITS) to control for historical trends in the outcomes over time, incorporating a one-year wash-out period.

**Define How Findings from this Multi-Center Study Will Serve as the Foundation for Future Studies or Future Funded Research:**

Despite widespread adoption of TVR across level 1 and 2 trauma centers, it remains unknown whether TVR improves trauma patient outcomes, and if so, what aspects of TVR are most essential. This mixed methods, multicenter study will serve as the foundation for future research into best practices for TVR that improve patient-level outcomes (morbidity and mortality). Specifically, it will generate preliminary data for a funded randomized control trial of best practice TVR initiation at level 1 and 2 trauma centers without existing TVR programs.

**Does Study Require Informed Consent, Describe Rationale:**

No informed consent is required as all data will be de-identified

**<u>Database Development</u>:**

**Do you have independent funding?:** **Yes** ☐ **No** ☒

**Does your study require upload of imaging studies?:** **Yes** ☐ **No** ☒

**If the cost of development of your database exceeds the allotted financial support from AAST, are you able/willing to fund the difference?:** **Yes** ☒ **No** ☐

**<u>Skeleton Table 1</u>**

| Variable* | Pre-TVR period (n=XXX) | Post-TVR period (n=XXX) |
|---|---|---|
| Age | | |
| Initial SBP | | |
| Initial HR | | |
| ED GCS | | |
| ISS | | |
| Penetrating mechanism, n (%) | | |
| Total product transfused 4h | | |
| Total product transfused 24h | | |
| Time from ED arrival to first hemorrhage control procedure | | |
| Inpatient mortality, n (%) | | |
| ED mortality, n (%) | | |
| Favorable hospital disposition, n (%) | | |

*Data are median [IQR, interquartile range] unless otherwise stated

**Key References-**

Bhangu A, Notario L, Pinto RL, Pannell D, Thomas-Boaz W, Freedman C, Tien H, Nathens AB, da Luz L. Closed loop communication in the trauma bay: identifying opportunities for team performance improvement through a video review analysis. CJEM. 2022 Jun;24(4):419-425. doi: 10.1007/s43678-022-00295-z. Epub 2022 Apr 12. PMID: 35412259; PMCID: PMC9002216.

Dumas RP, Vella MA, Hatchimonji JS, Ma L, Maher Z, Holena DN. Trauma video review utilization: A survey of practice in the United States. Am J Surg. 2020 Jan;219(1):49-53. doi: 10.1016/j.amjsurg.2019.08.025. Epub 2019 Sep 10. PMID: 31537325; PMCID: PMC8428979.

Dumas RP, Cook C, Holena DN, Qi Y, Tabone N, Studwell SL, Miglani A, Vella MA. Roll the Tape: Implementing and Harnessing the Power of Trauma Video Review. J Surg Educ. 2022 Nov-Dec;79(6):e248-e256. doi: 10.1016/j.jsurg.2022.08.010. Epub 2022 Sep 10. PMID: 36096880.

Rees JR, Maher Z, Dumas RP, Vella MA, Schroeder ME, Milia DJ, Zone AI, Cannon JW, Holena DN. Trauma video review outperforms prospective real-time data collection for study of resuscitative thoracotomy. Surgery. 2022 Nov;172(5):1563-1568. doi: 10.1016/j.surg.2022.06.021. Epub 2022 Aug 2. PMID: 35927077.

Scrushy MG, Nagaraj M, Burke K, Kuhlenschmidt K, Jeter S, Johnson D, Brown K, Edwards C, Marinica A, Vella MA, Holena DN, Park C, Dumas RP. Under the Lens: Team Perception of Trauma Video Review. J Trauma Nurs. 2023 May-Jun 01;30(3):171-176. doi: 10.1097/JTN.0000000000000723. PMID: 37144808.