ACS/TQIP Traumatic Brain Injury Best Practice Guidelines: 2024 Edition

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Disclosures

- Dr. Murtaugh does not have any financial disclosures related to the educational content of this presentation.
- Dr. Murtaugh does disclose a non-financial relationship as a participating member of the ACS TBI Best Practice Guidelines committee and engaged in development, revision and editing of the 2024 edition.

Objectives

- 1. Describe the purpose of ACS TQIP TBI BPGs.
- 2. Identify De Novo chapters included in the 2024 TBI BPG edition.
- 3. Review Rehabilitation Recommendations along the TBI severity spectrum.
- 3. Appraise facilitators and barriers of implementation of BPGs within trauma systems.

TBI is a Significant Public Health Challenge!

- Occurs in all age groups (approx. 4.8 million ER visits/year)
- Heterogeneous in nature
- 53% experiencing mTBI report persistent symptoms
- 3.2 million (USA) living with disability secondary to TBI
- Economic lifetime cost=750 Billion healthcare costs and lost productivity
- Poor understanding of individual and genetic characteristics on injury
- Caregiver burden
- Poor systems of care
- Lack of funding for long term community resources
- Now identified as a chronic condition with long-term consequences.

NASEM Report "*TBI: A Roadmap for Accelerating Progress, 2022*

American College of Surgeons Trauma Quality Improvement Program

TBI Best Practice Guideline Revisions

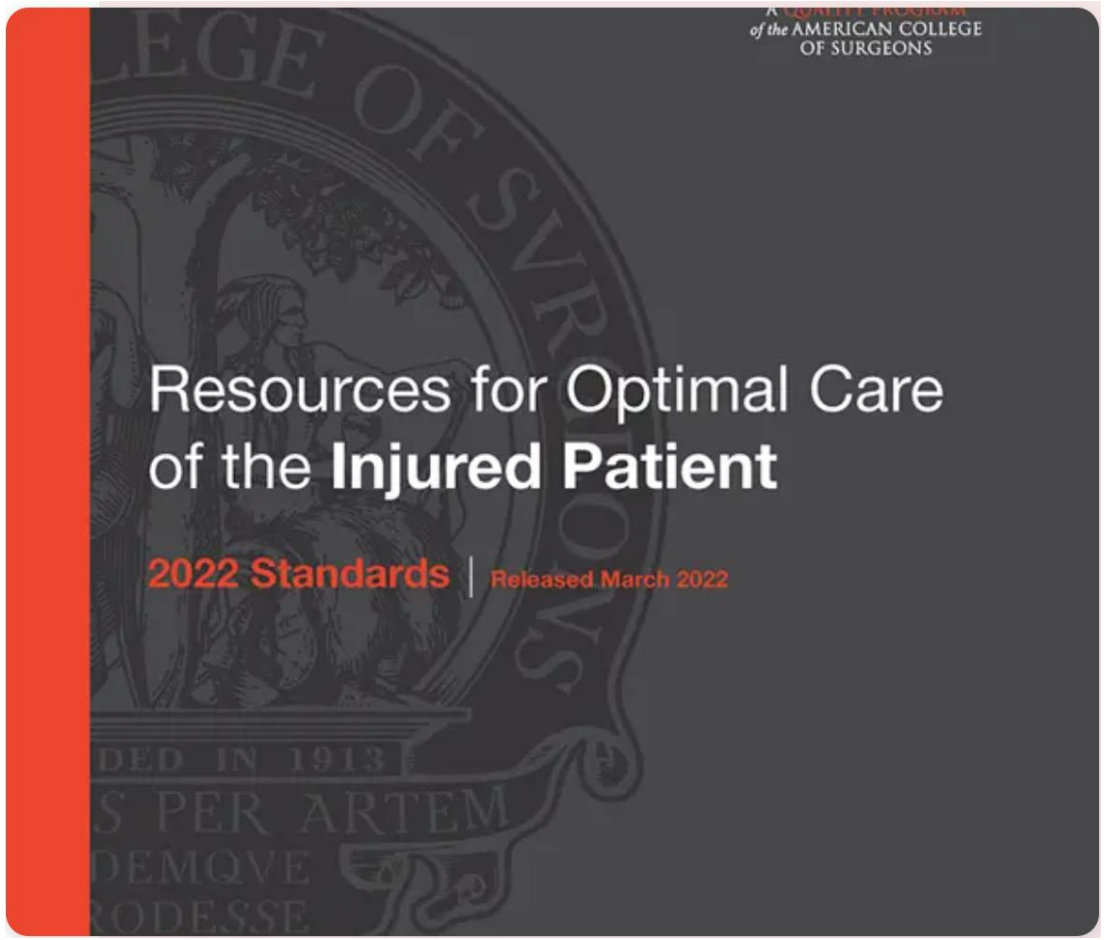
Dr. Geoff Manley-Committee Chair/Lead

https://www.facs.org/media/vgfgjpfk/best-practices-guidelines-traumatic-brain-injury.pdf

Published open access online Oct 29, 2024.

Resources for Optimal Care of the Injured Patient (2022 Standards)

- The Verification, Review & Consultation (VRC) program evaluates the care, aligned to the standards and expected scope of practice at each institution.
- These standards detail the principles regarding resources, performance improvement patient safety processes, data collection, protocols, research, and education for a trauma center.
- These standards will be effective for verification visits starting in **September 2023**.



For more information on the 2022 Standards, please visit the 2022 Resources Repository.

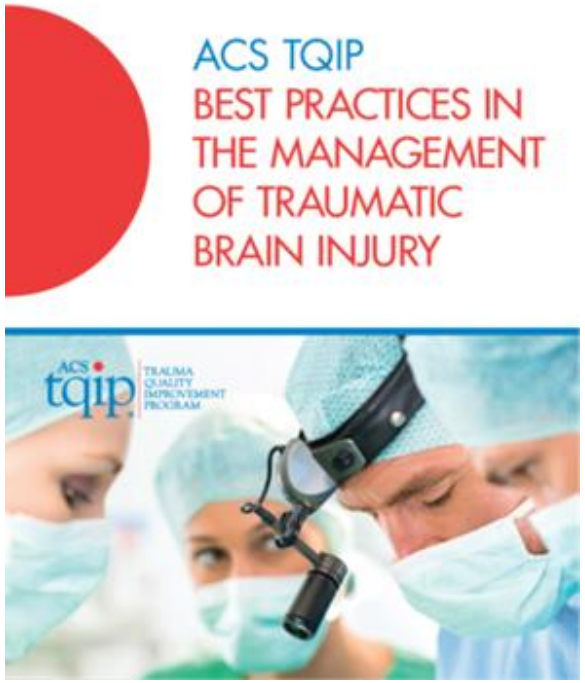
Current ACS/TQIP Best Practice Guidelines

- Acute Pain Management in Trauma Patients
- Child Abuse, Elder Abuse, and Intimate Partner Violence
- Geriatric Trauma Management (November 2023)
- Imaging
- Management of Orthopedic Trauma
- Management of Traumatic Brain Injury (2024 Edition Published in Fall)
- Massive Transfusion in Trauma
- Mental Health and Substance Abuse Guidelines
- Palliative Care
- Spine Injury (March 2022)

- https://www.facs.org/quality-programs/trauma/quality/best-practices-guidelines/

2015 TBI BPGs

- Resulted in improvement in patient care in certain domains
  - ACS/TQIP data
  - DVT prophylaxis increased from 48% in 2014 to 71% in 2022 for TBI
  - Identified predictors of ICP use in trauma centers is non-patient factor driven.
  - Increased understanding of variables influencing discharge destination from trauma centers after severe TBI.



- https://www.facs.org/media/mkej5u3b/tbi_guidelines.pdf

Growth of Evidence

- Classification TBI
  - GCS challenges
- Prognostication & Outcomes Severe TBI
- Outcomes Mild TBI
- Pediatric TBI
- Older Adult TBI
- FDA approved Biomarkers for TBI
- Pharmacology in TBI
- Benefits of Rehabilitation

TRACK-TBI
Transforming Research and Clinical Knowledge in Traumatic Brain Injury
International Traumatic Brain Injury Research Initiative

FITBIR
Federal Interagency Traumatic Brain Injury Research
INFORMATICS SYSTEM

TBIMS
Traumatic Brain Injury Model System
Since 1987

Need for an update in 2024

- Evolving science and evidence to change and improve standards of care for improved patient outcomes
- Sections renamed or expanded
- New sections/topics added
- Evidence-informed recommendations
- Recognition of importance of rehabilitation
  - Official partnership between ACS COT & American Congress of Rehabilitation Medicine

TBI BPG Committee

- 2015 & 2024 Edition led by Dr. Geoff Manley-Chair
- Work Group Members
  - Global Experts on TBI
  - 51 multidisciplinary experts
    - Trauma
    - Neurotrauma/neurosurgery
    - Neurocritical Care
    - Nursing
    - Rehabilitation
    - Pharmacy
    - Nutrition
- Clinical Editor

Met starting in August 2022 and met virtually till January 2024.

ACS TQIP TBI BPG 2024

- Triage/Transport
- Basic Assessment
- Imaging
- Surgical Management
- Timing of Extracranial Procedures
- ICP Monitoring
- Management of Intracranial Hypertension
- Neuromonitoring
- Prognostic Decision-Making/WOLST
- Ventilation & Tracheostomy
- DVT Prophylaxis
- Nutritional Support
- Outcome Assessment & QI

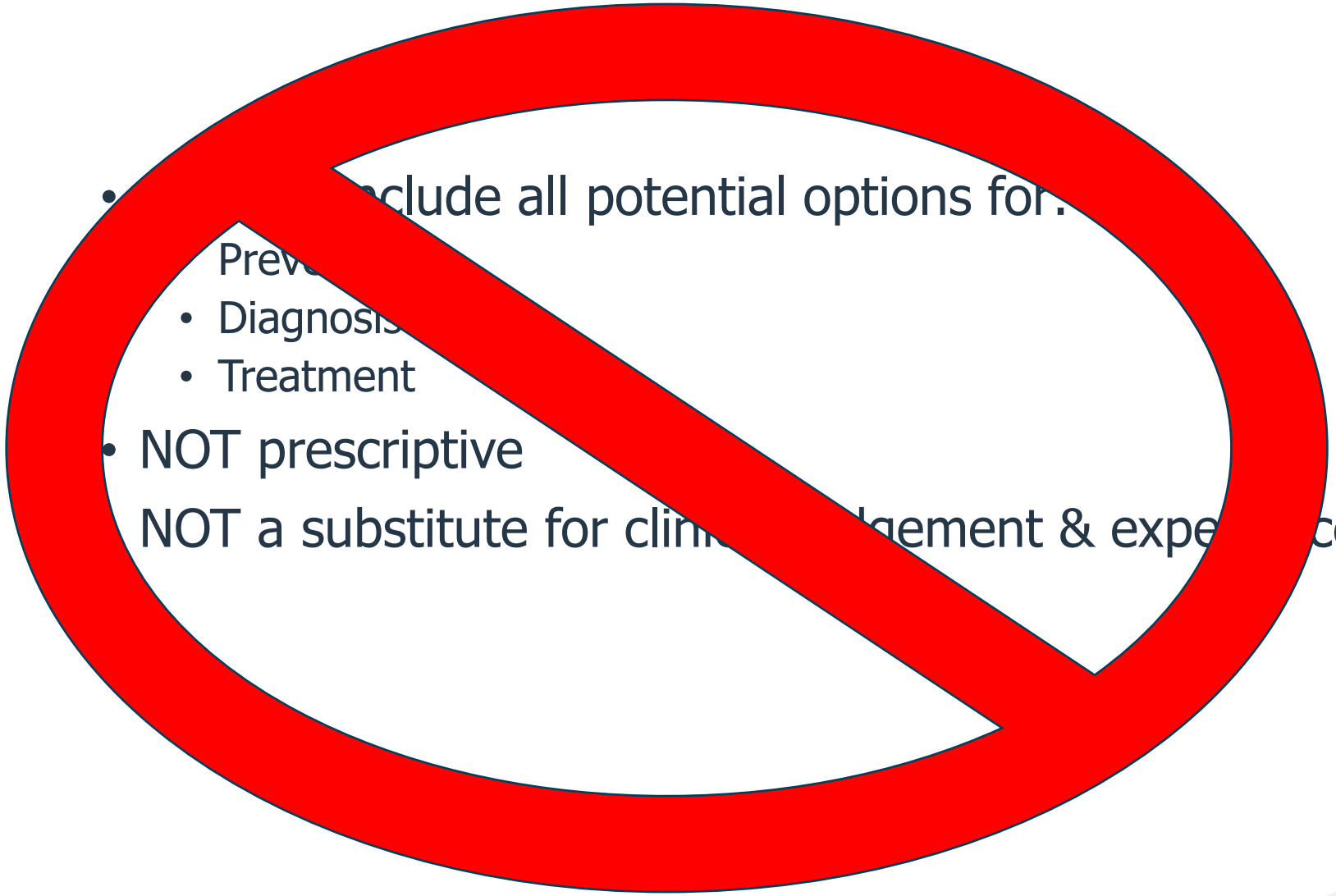
ACS TQIP
BEST PRACTICES IN THE MANAGEMENT OF TRAUMATIC BRAIN INJURY

New Sections in 2024

- **Blood Based BioMarkers**
- **Management of BCVI**
- **Pharmacological Management**
- **Early Rehabilitation**
- **Post Traumatic Epilepsy**
- **Management of GCS 13-15**
- **Systems of Post-Acute TBI Care**

- ***All sections will by Pediatric and Older Adult considerations***

What the ACS TBI BPGs are NOT



- Include all potential options for:
  - Prevention
  - Diagnosis
  - Treatment
- NOT prescriptive
- NOT a substitute for clinical judgement & experience

Highlights of 2024 TBI BPGs

Basic Assessment (Expanded & Renamed)

Key Points:

- GCS is reliable assessment of consciousness. However, Requires standardization.
  - Caution on use of GCS for prognosis, prediction of long-term outcome.
- Assess & report all 3 components of GCS
  - Eye
  - Verbal
  - Motor
- Assess pupillary light response
  - Diagnostic & prognostic value

- Apply principles of ATLS program.
- Use of quantitative pupillometry is superior to standard pupillary reactivity assessment.
- Consider confounds when assessing older adults with quantitative pupillometry.

Recommended GCS Standardization

- **More Severe Injuries with lower GCS**
  - 1. Spontaneous patient activities and responses are observed and recorded prior to the application of any stimulus.
  - 2. Verbal stimuli are provided while observing for eye opening, verbal, or upper extremity motor responses. **Note**: Document only the reactions of the best arm, not the legs.
  - 3.Use another stimulus to elicit a response (e.g., finger-tip pressure, supra-orbital pressure, trapezius pinch) when the patient has no response to verbal stimuli. Document the type of stimulus applied (i.e., central or peripheral), and then use this stimulus as a standard for future assessments.

Acknowledgement of Pitfalls of GCS

- Dichotomize
  - Mild
  - Moderate
  - Severe
- Antiquated to characterize an extreme heterogeneous entity
- Epidemiological convenience for research
- Out-dated
- Poor inter-rater reliability
- Multiple potential confounding factors
- Exacerbates diagnostic and prognostic dogmas
  - False negative and false positive cases

- GCS of <8 isn't coma in ≈≈ 78% of patients (MCS)
  - (Bodien, Y., et al 2021, *Journal of Neurotrauma)*

Pupillary Reactivity & Quantitative Pupillometry

- Important element of neurologic exam
- Provides diagnostic and prognostic information
- Standard pupillary assessment has poor inter-rater reliability
- Quantitative pupillometry is superior and recommended to standard pupil assessment.
- Can detect pupillary changes before standardized assessment. Earlier warning sign

- Starting Diameter (mm)
- Ending Diameter (mm)
- % Change
- Latency (s)
- Average Constriction Velocity (mm/s)
- Mean Constriction Velocity (mm/s)
- Average Dilation Velocity (mm/s)

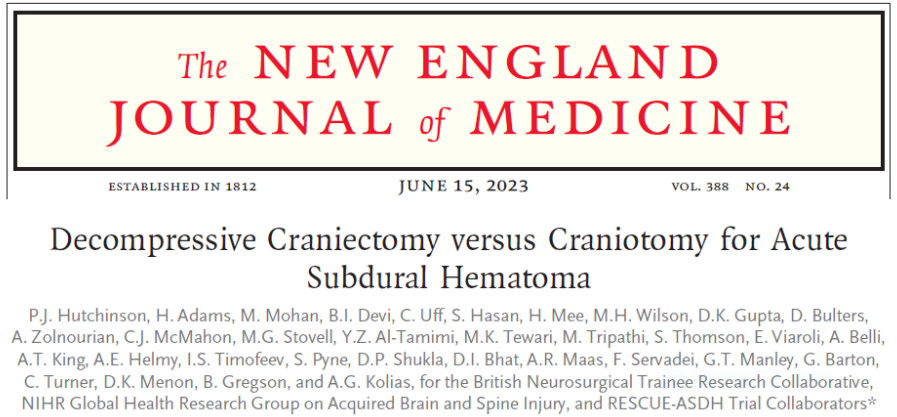
Surgical Management (Expansion)

Key Points:

- Evacuate large traumatic hematomas
- Perform large craniotomy
- Consider bone flap replacement
- Secondary decompressive craniectomy is effective and improves LT outcomes

- Surgical recommendations based on recent evidence-based guidelines.
  - (RESCUE-ASDH studies)
- Secondary craniectomy for ICP greater than 25mmHg

Primary Decompressive Craniectomy vs. Craniotomy for ASDH



- **JAMA June 2023: Hutchinson, P.J., et al.**
- 228 in Craniectomy & 222 in Craniotomy randomized groups
- GOSE Outcome Measure @ 12 months post injury
  - 2/2 measures
    - Additional cranial surgery
    - Adverse events
- No significant difference in outcome between groups at 12 months in GOSE scores.
- Secondary outcomes were also similar
- Crainectomy group had more wound related complications

Initial Surgical Management Pathway
(primary decompressive craniectomy)

Surgical Intervention

Trauma Craniotomy

Bone can be replaced without compressing the brain → Bone back

Bone cannot be replaced without compressing the brain → Bone out

Courtesy of Geoffrey Manley, M.D., San Francisco General Hospital, San Francisco, CA and Peter Hutchinson, F.R.C.S. (Surg. Neurol.) Addenbrooke's Hospital, University of Cambridge, UK

Initial Medical Management Pathway
(secondary decompressive craniectomy)

Initial medical management

ICP Controlled → Continue medical management

ICP* Uncontrolled → Consider secondary decompressive craniectomy

*(>25mmHg despite advanced medical measures)

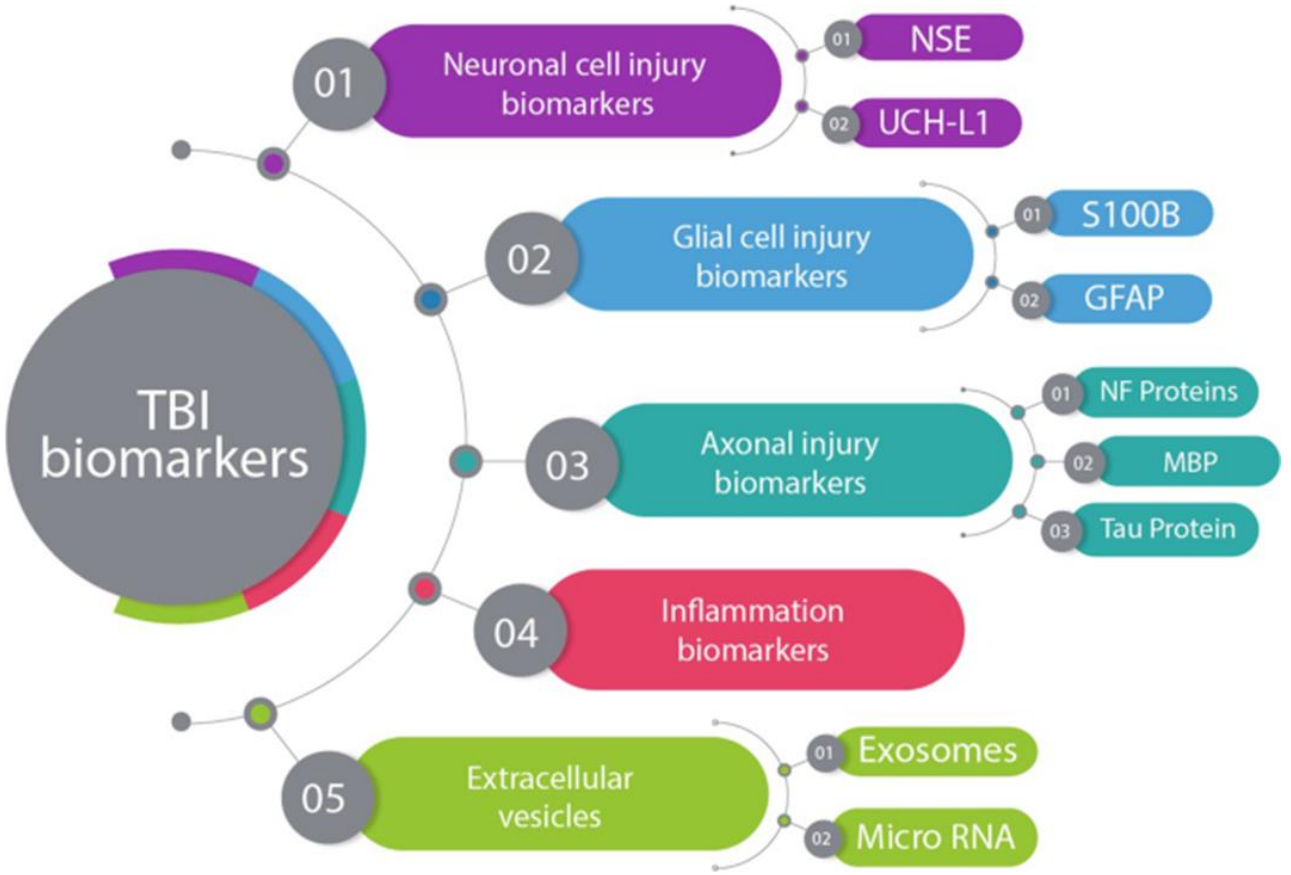
Courtesy of Geoffrey Manley, M.D., San Francisco General Hospital, San Francisco, CA and Peter Hutchinson, F.R.C.S. (Surg. Neurol.) Addenbrooke's Hospital, University of Cambridge, UK

De Novo Section 2024: Blood-Based Biomarkers for TBI

- Key Points:
  - Brain injury biomarkers can be used to determine the need for brain CT imaging in GCS of 13-15.
  - Extend of GFAP, UCH-L1 and S100B elevation on day of injury provides clinicians with an estimate of underlying structural brain injury severity.
  - Blood levels are also useful ad adjuncts for predicting functional recovery at 6-month post-injury.

De Novo Section 2024: Blood-Based Biomarkers

- **Blood Based Biomarkers**
- Recommended Acute (0-24 hours)
  - GFAP-likelihood of normal head CT
    - 30pg/mL cutoff
    - Aid in prediction of mortality and global function 6-12 months post-injury
  - UCH-L1-likelihood of normal head CT
    - 360pg/mL cutoff
    - Aid in prediction of mortality and global function 6 months post-injury
    - UCH-L1 more sensitivity to prediction at higher confidence interval vs GFAP
  - S100B-Diagnosis of TBI at acute time points
    - .10ug/L



Ghaith, H., et al., 2022 *Molecular Neurobiology*

Posti & Tenouvuo, 2022 *Act Neurologica*

De Novo 2024: Management of Blunt Cerebrovascular Injury

Key Points:

- BCVI initiate treatment with anticoagulation.
- Spine fractures single-most predictive factor for BCVI.
- Unidentified BVCI increases risk of stroke

De Novo 2024: Pharmacological Management

Key Points:

- Use of seizure prophylaxis
- Platelet transfusion is NOT recommended to reverse anticoagulation.
- Administer antibiotic surgical prophylaxis
- Antibiotics NOT recommended for EVD or ICP use.

- Guidelines and thresholds included for anticoagulation and anticoagulation reversal.

De Novo 2024: Late Post-Traumatic Epilepsy

Key Points:

- Educate families on PTE
- Follow patients long-term who have increased risk factors.
- Screen for PTE in follow up visits
- PTE requires treatment with anti-seizure medication.
- PTE risk increases over time so continue to perform ongoing screening.
- Highlights factors associated for increased risk of PTE.
- Discusses PTE impact on outcomes
  - Worse outcomes in comparison studies.

Prognostic Assessment & Family Communication

- ***Significant changes from 2015***

Key Points:

- Functionally-meaningful recovery may be possible even with altered consciousness in initial weeks post injury.
- Acknowledgement of prognostic uncertainty is recommended in communication with family. Shared-decision making is recommended.
- Decision regarding WOLST should be based on probability of meaningful recovery and patient's wishes.
- Provide aggressive treatment in severe TBI, including surgical procedures until clinical team and family agree further treatment is unlikely to result in meaningful recovery.
- Each trauma center to develop brain death determination policy from accepted standards.

Prognostic Assessment & Family Communication

2024: Significant changes in recommendations:

- Trials of aggressive therapy
- Trials of aggressive rehabilitation
- Suggested time to receive full treatment expanded
  - 72 hours post-injury to 4 weeks or more
  - Original 72 hour recommendation was arbitrary & NOT based on evidence
- Increased emphasis on family counseling and communication
- Recommendations of palliative care consults for older adults who were identified as frail prior to injury.
- Pediatric prognosis is fraught with uncertainty due to lack of evidence.

Congruent with 2018 AAN DoC Practice Recommendations

Neurology, September 2018

SPECIAL ARTICLE LEVEL OF RECOMMENDATION

Practice guideline update recommendations summary: Disorders of consciousness

Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology; the American Congress of Rehabilitation Medicine; and the National Institute on Disability, Independent Living, and Rehabilitation Research

Joseph T. Giacino, PhD, Douglas I. Katz, MD, Nicholas D. Schiff, MD, John Whyte, MD, PhD, Eric J. Ashman, MD, Stephen Ashwal, MD, Richard Barbano, MD, PhD, Flora M. Hammond, MD, Steven Laureys, MD, PhD, Geoffrey S.F. Ling, MD, Risa Nakase-Richardson, PhD, Ronald T. Seel, PhD, Stuart Yablon, MD, Thomas S.D. Getchius, Gary S. Gronseth, MD, and Melissa J. Armstrong, MD, MSc

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Neurology® 2018;91:450-460. doi:10.1212/WNL.0000000000005926

TRACK-TBI Data

TRACK-TBI

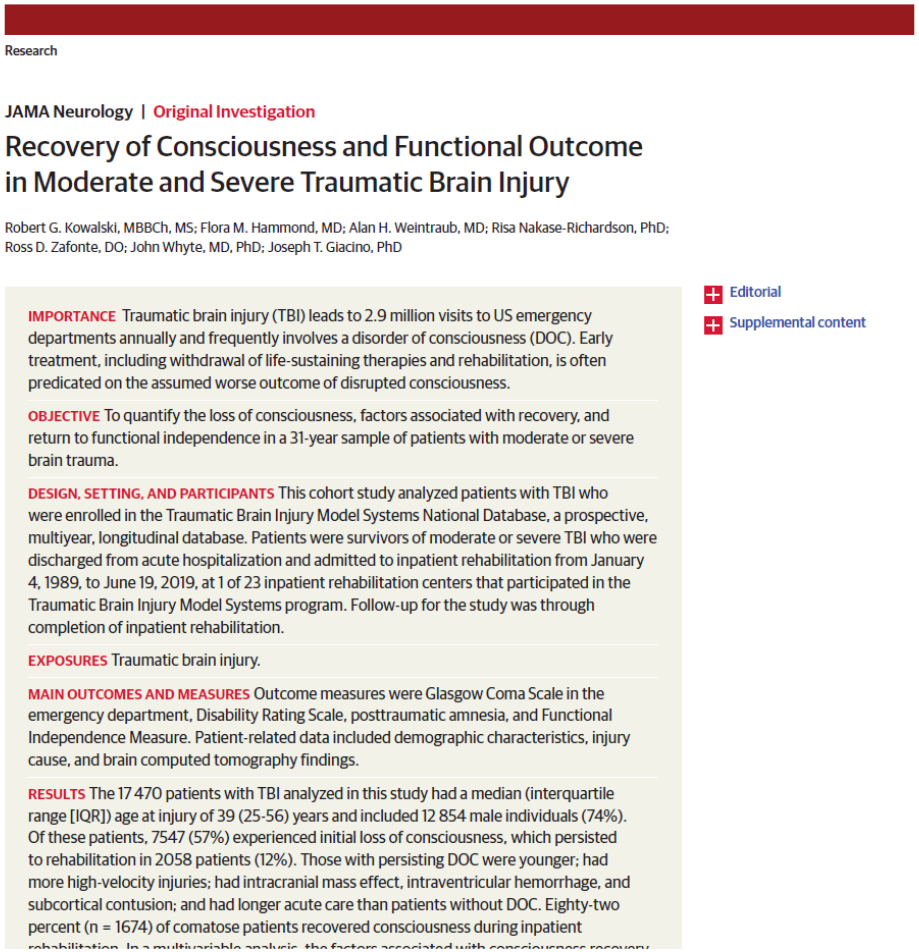
Transforming Research and Clinical Knowledge in Traumatic Brain Injury

International Traumatic Brain Injury Research Initiative

- 2,697 patients
  - 484 msTBI
- Initial GCS 3-10.
- 2 weeks post injury
  - 12 % GOSE=4-8 (favorable outcome)
- 3 months post injury
  - 45% GOSE 4-8
- 12 months post injury
  - 52.4% GOSE 4-8
- 84% recovered consciousness by 3 months that were VS at 2 weeks

Kowalski et al (2021) TBIMS Data Base *JAMA Neurology*

- 17,470 patients in cohort
- 12% prolonged DoC
  - DoC when admitted to rehab
- 82% recovered consciousness during IP rehab
- 43 points FIM gain in DoC vs 37 non-DoC
- 40% become partially or fully Independent during rehab.
- Average rehab LOS for study: 37 days



Research

JAMA Neurology | Original Investigation

Recovery of Consciousness and Functional Outcome in Moderate and Severe Traumatic Brain Injury

Robert G. Kowalski, MBBCh, MS; Flora M. Hammond, MD; Alan H. Weintraub, MD; Risa Nakase-Richardson, PhD; Ross D. Zafonte, DO; John Whyte, MD, PhD; Joseph T. Giacino, PhD

IMPORTANCE Traumatic brain injury (TBI) leads to 2.9 million visits to US emergency departments annually and frequently involves a disorder of consciousness (DOC). Early treatment, including withdrawal of life-sustaining therapies and rehabilitation, is often predicated on the assumed worse outcome of disrupted consciousness.

OBJECTIVE To quantify the loss of consciousness, factors associated with recovery, and return to functional independence in a 31-year sample of patients with moderate or severe brain trauma.

DESIGN, SETTING, AND PARTICIPANTS This cohort study analyzed patients with TBI who were enrolled in the Traumatic Brain Injury Model Systems National Database, a prospective, multiyear, longitudinal database. Patients were survivors of moderate or severe TBI who were discharged from acute hospitalization and admitted to inpatient rehabilitation from January 4, 1989, to June 19, 2019, at 1 of 23 inpatient rehabilitation centers that participated in the Traumatic Brain Injury Model Systems program. Follow-up for the study was through completion of inpatient rehabilitation.

EXPOSURES Traumatic brain injury.

MAIN OUTCOMES AND MEASURES Outcome measures were Glasgow Coma Scale in the emergency department, Disability Rating Scale, posttraumatic amnesia, and Functional Independence Measure. Patient-related data included demographic characteristics, injury cause, and brain computed tomography findings.

RESULTS The 17 470 patients with TBI analyzed in this study had a median (interquartile range [IQR]) age at injury of 39 (25-56) years and included 12 854 male individuals (74%). Of these patients, 7547 (57%) experienced initial loss of consciousness, which persisted to rehabilitation in 2058 patients (12%). Those with persisting DOC were younger; had more high-velocity injuries; had intracranial mass effect, intraventricular hemorrhage, and subcortical contusion; and had longer acute care than patients without DOC. Eighty-two percent (n = 1674) of comatose patients recovered consciousness during inpatient

Editorial

Supplemental content

De Novo 2024: Management of GCS 13-15

Key Points:

- Sizable subset of patients with GCS 13-15 have persistent symptoms.
- GCS 13-15, 50% of TBI goes undetected and undiagnosed.
- Implement appropriate screening tools to identify TBI
- Educate patients about their injury, options and resources for follow-up care for persistent symptoms.

- Whenever possible, patients should be seen by clinicians and an interdisciplinary team with expertise in management of severe concussion and persistent symptoms.

De Novo 2024: Early Rehabilitation

Key Points:

- Consider early multidisciplinary rehabilitation during initial plan of care on day of admission after TBI.
- Early rehabilitation is safe, feasible, cost effective who have not yet achieved medical stability or continue to require mechanical ventilation.
- Include PMR specialists on primary trauma team.
- Team should include PT, OT, SLP, psychology and nursing.
- Refer patient to specialized post-acute rehabilitation once medically stable.
- GCS 13-15 with persistent symptoms require referral to multidisciplinary rehabilitation.

Early Rehabilitation

- 24-72 hours post injury/trauma admission
- Consciousness assessment
  - Coma Recovery Scale-Fast
- Early mobilization
- Upright positioning
- Transfers
- PROM
- AROM
- Training family in PROM
- Management of post-traumatic confusion and agitation
- Intervention to promote resumption of self care activities
- Transition of care recommendations

Outcome Assessment & Quality Improvement

Key Points:

- Perform TBI OA using both global and multidimensional measures including physical, cognitive, communication, behavioral, psychological and well-being.
- Identify patient-specific factors indicating clinical decline as well as clinical improvement that could further be facilitated by rehabilitation or other treatment.
- Perform a TBI outcome assessment at multiple time points following injury.
  - 1, 3, 6, 12 months
- Recommended OA: Glasgow Outcome Scale-Extended
  - CDE for NIH, TBIMS, DoC CDE

Implementation of TQIP TBI BPGs

Education, Implementation & Integration

Key Points:

- BPG recommendations are intended as guidance to trauma centers in management of TBI.
- Trauma medical director, trauma program manager and staff have leadership role in implementation of TBI BPGs.
- Stakeholder workgroup implements the recommendations.
- Workgroup reviews the recommendations and complete gap analysis related to current TBI care within respective trauma center.

TBI Education & Follow-Up

Key Points

- Treat TBI as both an acute and chronic condition.
- Patients with TBI and their families need targeted education about brain injury, recovery, resources, and follow up care to enhance safety, coping, follow through, and outcome.
- Healthcare professionals can benefit from TBI education to improve patient care and outcomes.
- Upon discharge from the acute care hospital, assure that all patients with TBI have the opportunity to follow-up with a clinician experienced in managing TBI. This allows for further evidence-informed education, as well as longer-term screening, surveillance, and treatment as needed.
-

Education, Implementation & Integration

Implementing the *ACS TQIP Traumatic Brain Injury Best Practices Guidelines*

- **Key Points**
- These best practices recommendations, based upon evidence and expert opinion, are intended as guidance to trauma centers for the care of patients with TBI.
- The trauma medical director (TMD), trauma program manager (TPM), trauma liaisons, registrars, and staff have a leadership role in implementing the *ACS TQIP Traumatic Brain Injury Best Practices Guidelines*, supporting care of the patient with TBI, and monitoring guideline compliance.
- A stakeholder workgroup, receiving its directives from the TMD and the trauma operations committee, implements the best practices recommendations.
- The workgroup reviews the best practices recommendations and completes a gap analysis related to the current TBI care in the trauma center.

Dissemination to Implementation

- Resources for Optimal Care of the Injured Patient manual.

Standard #	Standard Name	Type	LI	LII	LIII (LIII-N)*	PTCI	PTCII
4.34	Trauma Registrar Continuing Education	TYPE II	x	x	x	x	x
4.35	Performance Improvement Staffing Requirements	TYPE II	x	x	x	x	x
4.36	Disaster Management and Emergency Preparedness Course	TYPE II	x			x	
5 | Patient Care: Expectations and Protocols							
5.1	Clinical Practice Guidelines	TYPE II	x	x	x	x	x
5.2	Trauma Surgeon and Emergency Medicine Physician Shared Responsibilities	TYPE II	x	x	x	x	x
5.3	Levels of Trauma Activation	TYPE II	x	x	x	x	x
5.4	Trauma Surgeon Response to Highest Level of Activation	Type I	x	x	x	x	x
5.5	Trauma Surgical Evaluation for Activations below the Highest Level	TYPE II	x	x	x	x	x
5.6	Care Protocols for the Injured Older Adult	TYPE II	x	x			
5.7	Assessment of Children for Nonaccidental Trauma	TYPE II	x	x	x	x	x
5.8	Massive Transfusion Protocol	TYPE I	x	x	x	x	x
5.9	Anticoagulation Reversal Protocol	TYPE II	x	x	x	x	x
5.10	Pediatric Readiness	Type II	x	x	x	x	x
5.11	Emergency Airway Management	TYPE I	x	x	x	x	x
5.12	Transfer Protocols	TYPE II	x	x	x	x	x
5.13	Decision to Transfer	TYPE II	x	x	x	x	x
5.14	Transfer Communication	TYPE II	x	x	x	x	x
5.15	Trauma Diversion Protocol	TYPE II	x	x	x	x	x
5.16	Trauma Diversion Hours	TYPE II	x	x	x	x	x
5.17	Neurosurgeon Response	TYPE II	x	x	x*	x	x
5.18	Neurotrauma Plan of Care for Level III Trauma Centers	TYPE II			x		
5.19	Neurotrauma Contingency Plan	TYPE II	x	x	x*	x	x
5.20	Treatment Guidelines for Orthopaedic Injuries	TYPE II	x	x	x	x	x
5.21	Orthopaedic Surgeon Response	TYPE II	x	x	x	x	x
5.22	Operating Room Scheduling Policy	Type II	x	x	x	x	x
5.23	Surgical Evaluation of ICU Patients	TYPE II	x	x	x	x	x
5.24	Trauma Surgeon Responsibility for ICU Patients	TYPE II	x	x	x	x	x
5.25	Communication of Critical Imaging Results	TYPE II	x	x	x	x	x

2.12 Injury Prevention Program—TYPE II

Applicable Levels

LI, LII, LIII, PTCI, PTCII

Definition and Requirements

All trauma centers must have an injury prevention program that:

- Has a designated injury prevention professional
- Prioritizes injury prevention work based on trends identified in the trauma registry and local epidemiological data
- Implements at least two activities over the course of the verification cycle with specific objectives and deliverables that address separate major causes of injury in the community
- Demonstrates evidence of partnerships with community organizations to support their injury prevention efforts

In Level I trauma centers, the injury prevention professional must be someone other than the TPM or PI personnel.

Additional Information

While there are no specific certification requirements for an injury prevention professional, this individual would have the skills to lead trauma center efforts to develop and maintain an organized, interdisciplinary, public health approach to injury prevention. Examples of injury prevention areas of focus include:

- Motor vehicle occupant safety
  - Child passenger safety seat education
  - Distracted driving
- Motorcycle and bicycle safety/helmet initiatives
- Pedestrian safety
- Fall prevention
- Firearm injury prevention programs
- Violence intervention and screening programs
- STOP THE BLEED® program as a community engagement strategy

Specific objectives and deliverables for each of the prevention initiatives should be documented in advance of implementation so that centers can describe their successes relative to their stated goals.

In trauma centers undergoing a consultation or initial verification review, the injury prevention program must implement at least one activity over the course of the reporting period with specific objectives and deliverables that address separate major causes of injury in the community.

Measures of Compliance

- Job description for relevant staff
- Graphs/tables highlighting recent injury mechanism trends from registry
- Report of injury prevention activities including the following:
  - Activity name
  - Activity date
  - Participation data
  - Evaluation of outcomes (where feasible)
- Program objectives and deliverables for each injury prevention activity
- Any materials (including posters, flyers, press releases, etc.) relevant to the injury prevention initiatives

Resources

Below are suggestions for planning optimal injury prevention and violence intervention strategies with the greatest impact.

- **Utilize available data:** Identify high rates of injury and the populations in which these injuries occur. Analyze data to determine the mechanisms of injury, injury severity, and contributing factors. Utilize multiple injury and death data sources to reflect the true burden of injury.
- **Target at-risk populations:** Identify, understand, and target efforts toward at-risk populations while being sensitive to generational differences, as well as cultural, religious, and other established customs. Engage target population as a key stakeholder in development, implementation, and evaluation of the intervention.[1]
- **Leverage partnerships:** Make use of other trauma centers, prehospital organizations, public health and violence prevention organizations, law enforcement agencies, schools, churches, and others interested and involved in community injury prevention efforts.
- **Choose effective or well-informed intervention strategies:** New intervention program development, assessment, and implementation are complex and time-consuming. Not all proven interventions work in every population. Evidence-informed interventions may still require adaptation for demographic and risk factor differences.[2–6]
- **Develop a plan:** Logic models are a best-practice method to plan intervention strategies and should be utilized to outline the intervention effort, including delineating risk and protective factors.[7]

Gap Analysis Example

Management Guideline	Met	Partially Met	Not Met	Priority	Comments
Serial neurologic assessment using GCS & pupillary reactivity.					
Age-specific imaging protocols					
SIBICC or TQIP-tiered management of ICP					

What next?

- Be aware of these new standards
- Contact your trauma center director(s) to ask how you can help in defining processes and developing protocols
- AAPM&R: group of chairs/stakeholders to brainstorm on strategy to increase awareness and best practices and examples to address the new standards
- More information: hammondf@iu.edu

Questions?

Thank you!!!

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